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The Branner Geological

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THE

RESOURCES OF CALIFORNIA,

COMPRISING THE

SOCIETY, CLIMATE, SALUBRITY, SCENERY,
COMMERCE AND INDUSTRY
OF THE STATE.

1874

BY

JOHN S. HITTELL.

SIXTH EDITION, REWRITTEN.

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PREFACE TO THE SIXTH EDITION.

I write the resources of a State, which, though young in years, small in population, and remote from the chief centers of civilization, is yet known to the furthest corners of the earth, and during the last twenty-four years has had an influence upon the course of human life and the prosperity and trade of nations, more powerful than that exerted during the same period by kingdoms whose subjects are numbered by millions, whose history dates back through thousands of years, and whose present stock of wealth began to accumulate before our continent was discovered, or our language was formed. I write of a land of wonders. I write of California, which has astonished the world by many marvelous facts in her history, and by the singular forms assumed by nature within her limits; by the great migration that suddenly built up the first large Caucasian community on the shores of the North Pacific; by her vast yield of gold, amounting to $1,000,000,000, preceptibly affecting the markets of labor and money in all the leading nations of Christendom; by the rapid development of her commerce; by the swift settlement of her remote districts; by the prompt organization of her government; by the liberality with which the mines were thrown open and made free to all comers; by the rush of adventurers of every color and of every tongue; by the high rates of her interest and wages; by the vast extent of her gold-fields, and the facility with which they could be worked; by the auriferous rivers in which fortunes could be made in a week; by pliocene streams richer than those of the present era; by beds of lava, which, filling up the beds of pliocene rivers, were left, after the erosion of the banks and adjacent plains, to stand as mountains, marking the position of great treasures beneath; by nuggets, each worth a fortune; by the peculiar nature of her mining industry; by new and strange inventions; by the washing down of mountains; by filling the rivers of the Sacramento basin with thick mud throughout the year; by six thousand miles of mining ditches; by aqueducts less durable, but scarcely less wonderful, than those of ancient Rome; by quicksilver mines surpassing those of Spain; by great deposits of sulphur and asphaltum; by lakes of borax; by mud volcanoes, geysers, and natural bridges; by a valley of romantic and sublime beauty, shut in by walls nearly perpendicular and more than three-quarters of a mile high, with half a dozen great cascades, in one of which the water at two leaps falls more than the third of a mile; by a climate the most conducive to health, and the most favorable to mental and physical exertion—so equable on the middle coast that ice is never seen and thin summer clothing never worn, and that January differs in average temperature only eight degrees of Fahrenheit from July; by a singular botany, including the most splendid known group of coniferous trees, of which half a dozen species grow to be more than two hundred and fifty feet high, and one species has reached a height of four hundred and fifty feet, and a diameter of forty feet in the trunk; by a peculiar zoölogy, composed chiefly of animals found only on this Coast, and including the largest bird north of the Equator, and the largest and most formidable quadruped of the continent; by the importation in early years of all articles of food, and then by the speedy development of agriculture, until her wheat and wine have gone to the furthest cities in search of buyers, and until her markets are unrivaled in the variety and magnificence of home-grown fruits; by the largest crops of grain, and the largest specimens of fruits and vegetables on record; by a society where for years there was not one woman to a score of men, and where all the men were in the bloom of manhood; by the first settlement of Chinamen among white men; by the rapid fluctuations of trade; by the accumulation of wealth in the hands of men, most of whom came to the country poor; by the practice, universal in early years, of going armed; by the multitude of deadly affrays; by extra-constitutional courts, which sometimes punished villains with immediate execution, and sometimes proceeded with a gravity and slow moderation that might become the most august tribunals; and by the establishment of what may be considered as a new nationality, with mental, literary, physical, and social characteristics differing from those of other portions of the American Union, although not aspiring in any way to political separation.

I am so much attached to California, that I could not live contentedly elsewhere; and I imagine that neither the earth, the sky, nor the people of any other country, equal that of this State. I confess that I am an enthusiast in her behalf and if I fail to do justice to her merits it will not be for lack of affection. Neither will it be for any lack of attention or industry. During the last twenty years, I have assiduously collected every thing within my reach relative to the industry, resources, natural history, and population of the State. I have looked through the newspapers published between Crescent City and San Diego, and have examined all the books written about the country, Spanish, French, and German, as well as English. I have been in the extreme north, and the extreme south; I have gone to both extremities by land and sea; I have traveled through her great interior valley, from Shasta to Tejon; I am intimately acquainted with her most fertile valleys and her most productive gold-fields; I know something of her mining and agriculture by experience and practice; and finally, I have endeavored to compress into this book all the important attainable facts.

I write of California while she is still youthful, and full of marvels; while her population is still unsettled; while her business is still fluctuating, her wages high, her gold abundant, and her birth still fresh in the memory of men and women who have scarcely reached their majority; and I write of her while she still offers a wide field for the adventurous, the enterprising, and the young, who have life before them, and wish to commence it where they may have a free career, in full sight of great rewards for success, and with few chances of failure.

Some passages of this sixth, as well as of previous editions, were originally written for other publications, and though they first appeared anonymously, are still mine.

I add as appropriate to this place, and as indicative of the feelings common among the old Californians towards the State of their adoption, the following address, which I delivered before the Society of California Pioneers, at their nineteenth celebration of the admission of the State into the Union, on the 9th of September, 1869.

I congratulate you upon meeting again at this, our nineteenth annual assemblage, to commemorate the organization of our State, and the formation of the nucleus of the American Empire on the Pacific, to revive the recollection of the impressive scenes witnessed in the early days of pioneer life, and, if possible, to give additional stimulus to our affection for California, our chosen home, to which we are bound by a multitude of cherished memories, by soul-stirring associations which no other land could have supplied to us. The ideas called up to-day belong, however, not exclusively to the anniversary of the admission of our State into the Union, and its attendant incidents. In this celebration we cannot overlook the facts that in this year fall the centennial anniversaries of the first white settlement of California, the discovery and naming of the Bay of San Francisco, and the first appearance of white men on the site of our city. And this year has witnessed an event of world-wide interest and of especial importance to us—the completion of the Pacific Railroad—forming a grand climax for the close of the first century of Californian civilization, that began with one of the lowest and ends with one of the highest phases of human society. We seem to have leaped at one bound from the bottom to the top of the ladder of progress.

The first era of California, that of Indian dominion and savage life, extends from an unknown and remote antiquity to 1769. In an epoch that belongs not to history or tradition, but to geology, while the Sacramento Basin was a great lake, while the higher parts of the Sierra Nevada were covered with glaciers, and still earlier, while numerous volcanoes were pouring out their lavas to form the northern portion of the Sierra, men lived upon its slopes, as their bones, their mortars, their pestles, their spear-heads and arrow-heads, then deposited in deep beds of gravel, and of late brought to light, bear witness. We have no conclusive evidence that the Diggers found here by the first Spanish explorers, more than three hundred years ago, had been preceded by a different race. The tradition that the Aztecs came from this Coast, and the theory that the North American Indians are descendants of Asiatics, are not sustained by any trustworthy proof. The aborigines were not able to adapt themselves to high civilization, and they are not represented among us to-day. They have left no art, no custom, no monument, (except a few mounds, the accumulation of shells, bones, coral, and ashes, around their rancherias) no original thought, no recollection of a noble deed, no tongue, only a few proper names, (such as Sonoma, Napa, Petaluma, Suisun, Tuolumne, Mokelumne, etc.) to remind us of their existence.

The second era, that of Spanish dominion and ascetic ideas, lasted fifty-three years, beginning on the 11th of April, 1769, when the brig *San Antonio* arrived at San Diego with the first party of white men who came to make a permanent settlement in what was then Upper or New California, and is now simply California. This settlement was under the control of Franciscan friars, whose purpose was to convert the Indians. Some soldiers accompanied the missionaries to protect their persons and property, and soon a white lay population began to grow up; but the dominant interest was that of the friars, and most of the inhabitants recognizing Spanish authority were Indian converts.

The Franciscans held that the chief virtues of life were chastity, celibacy, poverty, and abject humility, and the chief duties were frequent recitation of prayers, the mortification of the flesh, the sacrifice of the passions, and the renunciation of all social pleasures and secular interests for the sake of beatitude in a future existence. Twenty-one missions were founded, none more than thirty miles from the ocean; the first and most southern at San Diego, in 1769, the last and most northern at Sonoma, in 1823.

In July, 1769, a party under the supervision of friar Juan Crespi started by land to examine the coast northward. After journeying for three months among savages who showed no hostility, in October he discovered and named our bay, reached the site of our city, and here turned back. Seven years later the Mission of San Francisco was established. Seven years hence—in 1876—we shall celebrate the centennial anniversary of the white settlement of San Francisco, and also the centennial anniversary of the independent existence of our nation.

The Missions were in their best condition in 1814, (after which they were injured by the stoppage of pay and other consequences of the Mexican Revolution) but they continued to increase in population and property until 1826, when they had 24,611 Indian neophytes, 215,000 head of neat cattle, 135,000 sheep, and 16,000 horses, and harvested 75,000 bushels of grain. The friars of the ascetic era have all disappeared. Of their converts only a few hundred remain, and those, with rare exceptions, no longer occupy their old homes. Most of the Missions have served as centers round which towns have been built. Some of the adobe churches still stand as monuments of the industry of the neophytes, guided by friar architects. The oldest building of our city, erected more than half a century since, though lately renovated, is the church at the Mission, dedicated to St. Francis, the founder of the Franciscan Order, the preëminent hero of asceticism, whose name has been adopted by the San Franciscans, but whose practice is not followed by them, as the taste, the fashion, the beauty, the wealth, the luxury represented by this auditory, may testify.

The third era, that of Mexican dominion and pastoral life, lasted twenty-four years, beginning on the 9th of April, 1822, when the independence of Mexico from Spain was formally proclaimed and first officially recognized at Monterey, the capital of the territory. The white population increased slowly. The Mexicans were not a colonizing people. The journey from Sonora by land was long and beset by many hardships and dangers. The advantages of California were not generally known or appreciated. Most of the men who became prominent under Mexican dominion were officers or soldiers, or the sons of soldiers, sent out to protect the Missions. Most of the early immigrants came at the request and with the assistance of the Government. On the 29th of November, 1777, the first town was established at San José by a party of fourteen families, which had started from Sonora two years before; and on the 4th of November, 1781, the pueblo of Los Angeles was founded by another party. The rancheros and town people never agreed very well with the friars, who became subordinate in influence to the military and civil authorities soon after the Mexican flag was hoisted. The Indians ceased to obey their teachers, neglected their work, and plundered the Mission property. In 1835 the Missions were secularized—that is, orders were issued that part of the herds and agricultural implements should be distributed among the neophytes and rancheros, and the remainder should be disposed of for the benefit of the public treasury; but most of the property was soon in the possession of the chieftains and their friends. In 1842 only 4,500 Indians remained at the Missions, some of which had been deserted by the friars.

The Mexican Californians lived an idle, easy life. Their only income was derived from the hides and tallow of their neat cattle, which throve on the wild grass in the open country. They had no work and little worry. They were happy; they did not know any better. They had few excitements, and many of them had no anxieties. Most of them, and some of the old American residents, have regretted the change which has since taken place. From various miseries of life, common elsewhere, they were exempt. They had no lawyers, doctors, tax-gatherers, or newspapers; no steamboats, railroads, stage coaches, post-offices, regular mails, or stove-pipe hats. Bedsteads, chairs, tables, wooden floors, and kid gloves, were rarities. They were a large, active, hardy, long-lived race, who made up by their fecundity for the failure of the friars to contribute to the population of the territory. It was fashionable in those days to have large families. Ignacio Vallejo had twelve children; Joaquin Carrillo, (of Santa Barbara) twelve; José Noriega, ten; José Argüello, thirteen; José Maria Pico, nine; Francisco Sepúlveda, eleven; José Maria Ortega, eleven; and Juan Bandini, ten. These were all the founders of the large families of their respective names, and in most cases the progenitors of all of their name in the State. In the second generation there was no decline. Nasario Berreyesa had eleven children; José Sepúlveda, twelve; Guadalupe Vallejo, twelve; Josefa Vallejo, eleven; Feliciano Soberanes, ten; and José Antonio Castro, twenty-five. An old lady, named Juana Cota, died some years ago, leaving five hundred living descendants at the time of her death. There have been wonderful changes in California.

As the children nearly all married, and the white families were not very numerous, (there were only seven hundred ranchos or country estates in 1846) it happened that nearly everybody was the relative of everybody else by blood or marriage, and where these two bonds failed, the spiritual relation of godfather or godmother supplied the deficiency. All were cousins or *compadres* (co-fathers). They were all one large family, not only willing but glad to entertain their relatives, and glad to be entertained. Time with them was not money; knowledge was not power. Leisure, horses, beef, and beans—the essentials in those days for making long journeys—were abundant, and so their life was a succession of *paseos* and *fiestas*—riding and feasting.

But the social good feeling did not prevent political troubles. The Supreme Government at Mexico sent out carpet-bag Governors, who were expelled. Los Angeles and Monterey, the North and the South, contended for the Territorial Capital. The personal interests, the ambitions, of the Picos, Carrillos, Noriegas, Castros, Alvarados, and Vallejos, for the honors and profits of civil and military office, led to contests in which soldiers were frequently called out; but the revolutions were not very bloody, for only one man was killed in them previous to 1845, and he by accident. And yet they were brave, as they proved in the battle of San Pascual, when Gen. Kearney narrowly escaped destruction. From 1835 to 1846 these political troubles continued to increase in seriousness, and many of the leading men, having appealed in vain to Mexico for aid, were discussing the question whether they should not solicit the protection of England or the United States—the predominant influence being decidedly in favor of the latter—when the discussion was suddenly arrested by the conquest.

The American commercial era of California began on the 7th of July, 1846, when the Stars and Stripes were permanently hoisted at Monterey. An adventurous Boston boy—a *mozo Bostones*, as the old Spanish record calls him—took up his residence at Santa Barbara in 1794, and John Gilroy, a Scotch sailor, near death, was allowed to come ashore at Monterey in 1814; but with those exceptions Anglo-Saxons did not begin to establish themselves in California until after the overthrow of the Spanish authority opened the ports to foreign vessels, and the land to foreign settlers. Whalers and smugglers, mostly American, had for years been familiar with the coast. Boston merchants, engaged in buying hides and tallow, and selling cheap calico and trinkets, soon made their appearance, and they were followed by others of different occupations. Abel Stearns, Alfred Robinson, Henry Mellus, W. D. M. Howard, T. O. Larkin, Wm. Dana, D. A. Hill, Henry D. Fitch, David Spence, and W. E. P. Hartnell, arrived by sea before 1840. In 1825, thirty trappers under Jedediah Smith crossed the Sierra Nevada, about latitude thirty-nine degrees, and were the first white men to reach California overland from the Mississippi Valley. They all went back, but the information which they circulated induced two other parties of trappers to come in 1827, one of which entered the State at Fort Yuma, and thus the middle and southern trans-continental trails were opened. Among those who came with trapper parties were Yount, Wolfskill, Workman, Sparks, Leese, and Graham. In 1839, Sutter came by sea and established his fort, subsequently an important center for American influence. Workman, after his first trip with the trappers, returned to New Mexico, where he had lived, and induced a considerable party of his friends and neighbors to come to this Coast. The largest migration from the valley of the Rio Grande came in 1841, and included the Vaca and Peña families. In that same year, Joseph Chiles, of Missouri, came to California, and in 1842, went back with information that here people could live without work, and cattle without shelter or cultivated food; that fertile land could be got by the league for nothing; that it would be very valuable as soon as it should be covered by the American flag, and that annexation was inevitable and not far distant. His statements had much influence. The next year a party, including Bidwell and Reading, came; in 1844, another; in 1845, another, including Hensley and Snyder. Those who came overland, by their numbers and skill with the rifle, got the preponderance north of San Pablo Bay; the commercial immigrants settled on the southern coast, and there obtained a powerful influence by superior education, ability, and marriage into the leading families. Anglo-Saxon husbands were married to five Carrillos of Santa Barbara, three Carrillos of Santa Rosa, four Noriegas, four Bandinis, three Ortegas of Santa Barbara, two Vallejos, and one Soberanes. Some of them were English, but they were all glad of the change of government, and they induced the great majority of the Californians to submit quietly when the Stars and Stripes were hoisted. There was some resistance, but it was almost hopeless from the first. The American Cabinet had determined to own California, and indeed there is good reason to believe that, but for the expectation of getting this country, they would not have taken up arms when they did. Soon after the first encounter—on the Rio Grande—orders were issued to recruit a regiment of men in New York to serve in California, with the understanding that they should remain here as citizens after the war. Those only were to be received who would be suitable settlers for a new country. On the 29th of September, 1846, they sailed; on the 6th of March, of the next year, the first vessel arrived in our bay. They had little military duty to perform, but many of them have since become prominent men.

The gold discovery was made on the 19th of January, 1848, a month before the treaty of Guadulupe Hidalgo was signed, and five months and a half before peace was finally proclaimed and the American title to California acknowledged by Mexico. In June the whole territory was excited, and on the 20th of September the first public notice of the discovery printed in the Atlantic States, so far as I can learn, appeared in the Baltimore *Sun*, attracting little attention. Letters of army officers and small shipments of dust began to arrive in November, followed soon by fuller and more favorable accounts, and in January the States were in a fever. It was then that most of us determined to seek our fortunes in the distant El Dorado, in a land almost unknown to geography, on an ocean almost unknown to commerce. Those near the Atlantic started to double Cape Horn; those in the Mississippi Valley to cross the Rocky and the Snowy mountains. It was a bold adventure to go to a remote country of which we knew little, to engage in a business of which we knew nothing. Most of us, after getting our outfits, had no money left to bring us back, or support us in case of adversity. The amount of gold which had arrived from the mines was small, and the statements that there were rich claims for all who might come, were not justified by the knowledge of that time, though they were proved to be correct by subsequent discoveries. But the excitement was up, and we were not disposed to be critical or skeptical. The start was accompanied by the warnings of the old men, the tears of the women, and the envious and congratulatory remarks of our associates who wanted to come and could not. It was an impressive occasion, full of bright hopes and dark forebodings for many who remained, as well as for all who came.

Of the unorganized army of 20,000 men who, in May, 1849, broke camp at various points on the banks of the Missouri River between Council Bluffs and Independence, to march to the land of gold, I was one. A few had pack animals or mule teams, but most had oxen—three yoke and three men to a wagon, in which we had provisions for a year, as there was then no stock in the mines, and we knew not when we should find a supply. All were armed for defense. As for the men, we were the flower of the West: nearly all young, active, healthy, many well educated, all full of hope and enthusiasm. In our ignorance of the nature of auriferous deposits we expected, unless exceptionally unfortunate, to strike places where we should dig up two or three hundred pounds of gold in a day without difficulty. In visions by day and in dreams by night, we saw ourselves in the possession of treasures more splendid than those that dazzled the eyes of Aladdin. We compared ourselves to the Argonauts, to the army of Alexander starting to conquer Persia, to the Crusaders. Our enthusiasm was maintained by our numbers. The road, as far as we could see by day from the highest mountains, was lined with men and wagons; at night the camp-fires gleamed like the lights of a city set on a hill. Our brightest anticipations suffered no diminution as we advanced on our journey; vexatious and tiresome as many of the days were, we never forgot, we never doubted, the reward that was to compensate us. The long march of two thousand miles, (for we were nearly all afoot, and there were no seats in the wagons) the fording and ferrying of cold and swift rivers, the repeated preparation for Indian attacks of which false alarms were spread, the tedious guarding of the cattle at night, the long marches over the desert, the oppressive heat and the still more oppressive dust of the alkaline plains, the toilsome ascent of the mountains, which seemed so steep that we doubted whether our oxen could climb up — all these were borne, if not cheerfully, yet without regret that we had ventured upon them. I can mention but I cannot describe the anxiety of finding that a desert which we expected to cross in forty miles was much longer, and on being told by a man who met us that he had been thirty miles further and found no sign of grass or water. Our oxen were already exhausted, and such a distance was impracticable. Nobody that we knew had been over the road, nor had we any guides. We went on, however, and found two families—men, women, and children—in tears, their oxen all dead, themselves helpless. We still pressed on, and the next morning we and the unfortunate families were in camp at an oasis, and fiddling and dancing followed the suffering. Neither can I describe the delight with which we looked down from the summit of the Sierra Nevada over the distant valley of the Sacramento, dim and golden in the rays of the setting sun.

We had come to dig for gold, and nearly all who came by land went to mining. Though we did not make so much as we had hoped, we still found the placers wonderfully rich. It was no uncommon event for a man alone to take out five hundred dollars in a day, or for two or three, if working together, to divide the dust at the end of the week by measuring it with tin cups. But we were never satisfied. Others were getting more: we were not making enough. We went prospecting far out into the districts occupied by hostile Indians; we found diggings that would at last make millionaires of us; but in the midst of our rejoicings we ran out of provisions, and had to live for days on grass and acorns, picked from the holes in trees where they had been placed by woodpeckers. We had to meet the savages in battle; and more dangerous than that, we had to swim the large mountain torrents in full flood height. For months we slept under no shelter and saw no house. And worst of all, our diggings, which we had gone so far and risked so much to find, at last deceived us. They were not so rich as we imagined; the water gave out, and we were not numerous enough to keep up a guard at all points against the Indians. All these things I went through in person, and my experience was, perhaps, not so eventful as that of most pioneer miners. The expenses, the time spent in traveling and prospecting, and the lack of all the luxuries and many of the comforts of life, made many of us think it was cheaper to get gold in any other way than by digging for it in the placers. We abandoned the mines. Our bright dreams of becoming millionaires by washing the sands of the Sierra Nevada were all dissipated. Nor have we, as a class, made large fortunes in other pursuits, and of those who have, not a few have lost them again. But when we look back at the interval of twenty years, we do not regret that we became pioneers. We had demanded of California that she should fill the purses of every one with gold. She refused that demand to many, but she gave to all a cherished home, a sunny and genial sky, a fertile soil, a delightful landscape, a clime suited to the development of every energy, the companionship of the most intelligent and enterprising people, and a site suited for a great city and for the concentration of the commerce of a wealthy coast. She gave us the greatest relative abundance of gold known in the world. She compressed, within a few years, the progress that elsewhere would have required a century. Our business has been unparalleled in its activity. Our lives have been a rapid succession of strong sensations. Great wealth has hovered about us all, within reach of all, and if many of us did not know the precise moment for grasping it, still we have for years been interested in the chase; and perhaps the active excitement of pursuit has given us more pleasure than we could have enjoyed in possession. Many of us have gone back to the Eastern States, intending to make homes there, but found the attempt a complete failure. Life was a dull and commonplace routine; once accustomed to the whirl of Californian speculation and the cordiality of Californian society, we could not live without them.

For a long time we could not think or speak of this as home. We had started with the expectation—the promise—of soon returning. When we first saw the brown mountains and the bare plains of California in the fall of 1849, it did not occur to us that we should ever want to live here. There was nothing here to reward ambition save gold. Our mothers, sisters, sweethearts, wives, remained in "the States," and for years we longed to get back to them. And they, deprived by unjust and oppressive social rules of an equal chance in the race of life, hoped that we would come to give them our companionship and assistance. The affections of a million families throughout the civilized world were fixed upon California by such bonds. The sorrow caused by these separations—the disappointments that resulted from many causes—were great. One of those who looked in vain for the return of her Californian, [Mrs. Akers] wrote these pathetic lines:

* * * * * *

"Why don't he come? He said the leaves then springing
  At his return should still be fresh and green;
How oft they've sprung and faded without bringing
  His truant footsteps to his hearth again!
At first, there came soft oft-recurring token,
  As if to save his memory by the sign;
What need? Can they forget, who bow heart-broken
  At Memory's shrine?

* * * * * *

"Why don't he come? Not all the glittering treasures
  That freight the navies through the Golden Gate
Can buy me back my heart's once healthful measures,
  Or check the current of my hastening fate—
Dispel the gloom in which I am benighted—
  Restore the lost, I live but to deplore—
Revive again my hopes all dashed and blighted—
  For evermore.

"Why don't he come? Like traveler belated,
  Perhaps he stays and slumbers by the way:
Where was he faring when with greed unsated
  Death claimed the weary wanderer as his prey?
Did I but know, to seek his nameless ashes
  My soul would garner all its wasting fires,
Like the spent taper which a moment flashes
  And then expires."

None of the great battles in the late war broke so many heart-strings and caused such wide-spread pain, as did the Californian gold migration; but on the other hand, scores of thousands of families which would have otherwise suffered the privations of life-long poverty, were placed in comparative comfort by the remittances of their friends in the mines; and that the general influence of California on society has been highly beneficial, there is no room to doubt.

The sudden rise of the gold production to sixty million dollars; the excitement about Kern River, Fraser River, Washoe, and White Pine;

the Vigilance Committee; the great fires and floods; the development of our agriculture and horticulture to surpassing excellence in some branches; the introduction of the Panama and river steamers; the construction of the Panama Railroad; the establishment of the pony express, overland stage line, the trans-continental telegraph, and the trans-Pacific steam line; and last of all, the completion of the Pacific Railroad—all these have made epochs in our lives. In the consciousness and memory of every pioneer, however slight his importance may be for others, the history of the State since he arrived here is an important part of his personal history. Some of us can hardly look at a prominent land-mark, between Shasta and San Bernardino, without recollecting that it is associated with some interesting incident of his personal experience.

In San Francisco, the chief port, the metropolis, the main pleasure resort, the center of wealth and luxury on our Coast, life could not be dull. Existence received a zest from the powerfully tonic effect of the climate, impelling all to the open air every day, the excitements of frequent public demonstrations, the stimulus of an extraordinary throng of business, the composite character of the population representing every leading nation in a small space, and the all-prevailing influence of an enterprising daily press that gave expression and intensity to every phase of an excitable public feeling. The building of long wharves, the cutting down of high hills, the filling of the coves, the construction of a site as well as of the city to occupy it, were wonders that never lost their interest. For years our only communication with the Atlantic States and Europe was by semi-monthly steamers, which in large installments and at relatively long intervals brought us all our news and our immigrants, and carried away our gold and our Californians going to visit Eastern friends. The proportion of the arrivals and the departures to the population, and of the treasure shipment to the business, was so great, that steamer day was a shock that was felt throughout the State. Nearly everything we consumed, save the cereals, fresh fruits, fresh meats, and coarse furniture, was imported from the North Atlantic, from which we were five months distant; that is, we could not obtain goods until five months after we ordered them from here. The smallness of our stocks and our distance from all large markets offered facilities for forestalling, and gave to mercantile business a speculative character, the influence of which was felt in all classes of society. The abundance of money, the rapid growth of the city, the wonderful productiveness of the Washoe silver mines, and the success of forestalling speculations, made many fine fortunes and stimulated everybody to aspire after wealth. The Latin poet longed for a life of ease, with dignity; the Californian longs for a life of speculation, with success. Whatever else may be said of the Pioneers, they will not be accused of rusting out.

Nor will it be said of them that the passion which drove them to incur the dangers, the privations, and the toils of adventure in an unsettled and almost unknown country, was sordid. They risked their lives and exerted all their energies for gold, but with no miserly feeling. They spent their money as fast as they made it, too many even faster. Not parsimony, but extravagance, distinguishes the State. Yet it is not a base extravagance. Our community is highly intelligent; our pleasures are intellectual and refined. Our numerous charities, our munificent contributions to the Sanitary Fund, our free schools, our public libraries, our frequent concerts, the liberal patronage of the theaters, this elegant temple of the drama [the California Theater] in which we have to-day assembled, suggest the dominant feelings and tastes of San Francisco. Great men have made their preferred home among us, and found here their most appreciative friends. It was among us that Baker and Starr King reached their highest flights of oratory. They were with us in life, they remain with us in death. Grant, Sherman, and Sheridan spent many of their best years in our State, and were here prepared for the responsible service to be performed after leaving us. Halleck and Yale have contributed works of permanent value to our legal literature; Dwinelle, Randolph, and Tuthill have shown eminent ability in their historical labors. Our poetry, our humorous writings, our pictures, have done credit to us at home and abroad, though but beginnings.

The companions of Cortez in his conquest of the Aztec Empire—even the poorest and most ignorant of them—were distinguished and pointed out as *conquistadores* as long as they lived; and it appears to me that we pioneers accomplished a work, different in many respects from that of Cortez, but not altogether unlike in the spirit in which it was undertaken and the importance which it assumed. We did not subdue and plunder the great empire, but we founded a new one, which already, in twenty years, occupies a more important place in commerce and industry than Mexico, with three centuries of civilization and eight millions of people. The exploits of the Mexican *conquistadores* did not find an appropriate and immortal record till Prescott wrote in our own time; the adventures and labors of the Californian pioneers may go as long before they are told in a history that will charm men to the remotest age. If I were a poet and felt myself capable of maintaining the epic flight, I think I could find in the great Californian gold discovery and its results, a subject more congenial to the taste of this age, richer in impressive suggestions, in strange and romantic incidents, and generally in the material for a great poem, than the conquest of Troy or Jerusalem, the adventures of Ulysses or Eneas.

Much we have seen, more we shall see. Our State is the Italy of the New World, possessing a dower of beauty not inferior to that of the Latin Peninsula; but, unlike that, not destined to be fatal in its attraction. The descendants of the Goth, the Vandal, and the Hun, who crushed the ancient civilization of Italy under their fierce barbarism, of the German, the Frank, and the Spaniard, whose favorite battle-fields for centuries were the plains of Lombardy and Naples, will come not to contend with us in arms, but to compete with us in arts. We shall gain victories and celebrate triumphs more numerous and more glorious than those of Republican and Imperial Rome, but our triumphs will be those of good will—the triumphs of the architect, the road builder, the engineer, the inventor, the farmer, the miner, the scientist, the author, the painter, the musician, the orator. They will be celebrated not by processions, with generals riding in gilded cars, dragging captive kings in chains, but by intellectual gatherings, art exhibitions, and industrial fairs. The highest civilization will make one of its chief centers here. The coast valleys from Mendocino to San Diego, on account of the mildness and equability of their climate, surpassing even that of Naples, will be the favorite place of residence for many thousands from abroad. They will fill the land with wealth, luxury, and art. California will occupy in the hemisphere of the Pacific, as a focus of intellectual culture, a position similar to that long held by Attica in the basin of the Mediterranean. Looking confidently forward to such a result, hoping to see much of it accomplished in our own time, let us endeavor to lay a broad, solid, and generous foundation for the political, industrial, and educational greatness of our State; let us be proud that we have taken part in a work which has contributed much and will contribute more to stimulate commerce and to extend civilization; and, as a consequence, to enrich and benefit mankind: a work which will be forever prominent in the history of humanity.

J. S. H.

SAN FRANCISCO, August 1st, 1863.

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Resources of California.

RESOURCES OF CALIFORNIA.

CHAPTER I.

TOPOGRAPHY.

§ 1. *General Remarks.*—CALIFORNIA has a peculiar topography. No other country comprises within so small a space such various, so many, and such strongly-marked natural divisions, isolated volcanic peaks, vast domes of granite, steep and rugged mountain ridges, fertile and beautiful valleys, bare deserts, spacious bays, magnificent rivers, unparalleled waterfalls, picturesque lakes, extensive marshes, broad prairies, and dense forests—all these are hers.

§ 2. *Area.*—The reports of the Federal Land Office, published at Washington, say the area of the State is 188,981 square miles; but J. H. Wildes, chief draughtsman in the office of the Federal Surveyor-General of California, a more trustworthy authority, says the nearest approximation that can now be made is 155,000 square miles, or 99,200,000 acres.

The State extends from latitude 32° 31′ 59″—that is the position of the monument marking the southwestern corner of the State, on the boundary of Lower California—to 42°. The coast line is 1,097 miles long. In general shape, California is a long parallelogram, 800 miles in length by 190 in width.

The first topographical division of the State may be into the *Coast* and *Interior* districts, separated from each other by the main ridge of the Coast Mountains, which runs the whole length of the State, nearly parallel with the ocean, and about fifty miles from it. The Coast district may be subdivided into the *Coast Mountains* and the *Coast Valleys*. The Interior district may be subdivided into the *Sierra Nevada*, the *Sacramento-San Joaquin Basin*, the *Klamath Basin*, the *Enclosed American Basin*, and the *Colorado Desert*.

Of the 155,000 square miles in the State, there are, at my estimate, 42,000 in the mountains and valleys of the Coast, 40,000 in the Sierra Nevada, 30,000 in the low land of the Sacramento-San Joaquin Basin, 20,000 in the Enclosed American Basin, 15,000 in the Colorado Desert, and 8,000 in the Klamath Basin. In the 42,000 square miles of the Coast slope, 16,000 may be put down as valley and 26,000 as mountain. The term "Basin," as used here, means the entire area with a common drainage. Thus, the San Joaquin Basin is the region between summits of the Sierra Nevada and the Coast Range, south of latitude 38° 20′; the Sacramento-San Joaquin Basin is all between the summits of those mountains, from Tejon to Mount Shasta.

§ 3. *The Coast Range.*—The Coast Range, though not so high or so wide as the Sierra Nevada, may be considered the main orographical feature of California, because it alone extends through the whole length of the State. Its height is from two thousand to six thousand feet; its width from twenty to forty miles. It is composed of a multitude of ridges, of which the Diablo Ridge is the main stem, while all the others are branches springing out to the westward. We find on the map, that in latitude 34° 20′ the Santa Susanna Ridge branches off and runs southwestward; in 34° 30′ the Santa Inez Ridge starts and runs westward; in 34° 40′ the Santa Barbara Ridge turns west northwest; the Santa Lucia Ridge separates from the main trunk in 35°, with a northwestward direction; the Gabilan Ridge has its origin in 36° 10′, and its course is north northwest; the Contra Costa Ridge appears in 37° 10′, and is parallel with the Gabilan. These ridges and their intervening valleys make up the entire slope between the summit of the Coast Range and the ocean, from 34° 20′ to 38° 30′, beyond which line the regularity of the formation ceases, and the valleys are small and crooked. The Contra Costa Ridge forms the eastern boundary of the Alameda plain, and separates Napa from Sonoma Valley. The Gabilan Ridge, named after a prominent peak, the Gabilan, in Monterey County, forms the backbone of San Mateo, San Francisco, and Marin Counties, and separates the Santa Clara from the Salinas Valleys. The valleys south of the Salinas are the Cuyama, Santa Inez, and the Saticoy (or Santa Clara of the South). The principal peaks of the Coast Range, including San Bernardino, are in the Diablo Ridge.

§ 4. *Coast Rivers.*—The rivers of the Coast Mountains have necessarily but a short course. Those south of the bay of San Francisco are the San Lorenzo, Pajaro, Salinas, Cuyama, Santa Inez, Saticoy (or Santa Clara), Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Luis Rey, San Dieguito, and San Diego. Some of these are large streams in wet winters; but, in the drought of autumn, all those south of the Salinas are swallowed up in the sands before reaching the ocean. Most of them are constant streams to within ten or fifteen miles of their mouths. The Santa Ana, the largest river on the southern coast, rises in Mount San Bernardino, and is in its meanderings nearly one hundred miles long; yet only in very wet seasons, once in six or eight years, succeeds in getting to the sea. The San Gabriel River sinks before reaching Monte, in Los Angeles County, and, after passing three miles under ground, rises again. The intervening space, where there is no river, is very moist, sandy ground, through which the water spreads and soaks.

W. H. Emory, in his report as member of the Mexican Boundary Commission, writes thus:

"The point at which water ceases to flow is quite variable; its more usual upward limit being marked at or near the passage of the stream from the first rocky ranges into the tertiary formation. The point, however, as before stated, is by no means a fixed one: thus, during the night it extends farther downward than in daytime; in cloudy weather, for the same reason, its course is more prolonged than under a clear sky. In the stream-beds themselves, however dry, water is generally found a short distance below the surface.

"The descent of these streams in the rainy season may be either a gradual process in the progressive saturation of their sandy beds, or, the saturation being accomplished by previous showers, the irruption may be sudden. A fine example of this sudden appearance was observed in the San Diego River, in December, 1849; when, after a rainy night, by which its sandy bed was completely saturated, the upper stream suddenly appeared in the form of a foaming body of water, moving onward at the rate of a fast walk, curling round the river-bends, absorbing the pools, and soon filling its bed with a brimming, swift current. An instance of the more gradual descent was seen in the following season, (December, 1850) when, from the absence of local rain, its downward progress was slow and interrupted."

The only navigable stream south of San Francisco Bay is the Salinas, and that but for small vessels, and near its mouth.

North of San Francisco the main streams rising in the Coast Mountains are the Russian, Eel, Elk, Mad, and Smith Rivers, all permanent, but none navigable.

The rivers north of the Golden Gate are sometimes closed up with sand thrown across their mouths by storms from the south, and these barriers may remain for days, the waters meantime finding their way through by percolation. The Klamath, the largest of these streams, has occasionally been accessible for vessels of deep draft, but as the sands frequently shift their position, the idea of obtaining a permanent or convenient harbor there has been abandoned, at least for the present generation.

§ 5. *Coast Lakes.*—The only large lake in the Coast district is Clear Lake, eighty miles northward from San Francisco. It is twenty miles long, and varies in breadth from two to ten miles. Surrounded by a small valley of fertile land, it lies in a deep basin bounded by high mountains, with an outlet to the eastward, where its surplus waters are carried off by Cache Creek to the Sacramento. The water of Clear Lake is limpid; the vegetation on its banks abundant and vigorous; the scenery beautiful and romantic. In Amador Valley, twenty-five miles eastward from San Francisco, there is a small lake, covering a couple of hundred acres, and Soap lake, of about equal size, in Pajaro Valley. Lake Elizabeth, forty-five miles northward from Los Angeles, and Alamo Lake, in San Diego County, occasionally dry up, and then, after wet winters, reappear.

§ 6. *Capes.*—California has two capes: Cape Mendocino, in 40° 25′; and Point Argüello, in 34° 25′. The former is reputed to be the stormiest place on our coast; the latter is the southern limit of the frequent cold fogs and cool summers. Near Point Argüello, but less prominent, is Point Conception, which, however, is frequently mentioned as the main cape at the bend of the State.

§ 7. *Islands.*—About forty miles westward from San Francisco are the Farallones, seven little islands of bare rock, the largest with an extent of a couple of acres, and of no significance save as a danger to shipping, and as a point where a large lighthouse is maintained. All the other islands of California are between 32° 50′ and 34° 10′, the farthest one being about sixty miles from the mainland. They are named Santa Cruz, Santa Catalina, San Clemente, Santa Rosa, San Nicolas, Anacapa, and Santa Barbara. They are all hilly, rocky, barren, and of little value. Santa Cruz, the largest and best of them, has good water and a few trees. It is twenty-one miles long, with an average width of about three miles. All these islands appear to be peaks of submerged mountain-ridges. Between them and the mainland lies the Santa Barbara Channel.

§ 8. *Bays and Harbors.*—California has four land-locked bays—Humboldt, Tomales, San Francisco, and San Diego, all of them long, narrow, and separated from the ocean by narrow peninsulas, their longer axes being parallel with the coast. The roadsteads are numerous. Further mention is made of them in the chapter on commerce.

§ 9. *Tule-Land.*—Along the borders of most of the bays, the Tulare and Kern Lakes, and the Sacramento and San Joaquin Rivers, there are extensive tracts of swamp-lands, usually called "tule-lands," from the *tule*, a species of rush, which grows on them. Nearly all the tule-land west of Sacramento and Stockton, to which points the tides extend, are salt marshes; but north of Sacramento and south of Stockton the tule-lands are fresh-water swamps. The area of the tule-land is estimated to be 3,000,000 acres.

§ 10. *Sierra Nevada.*—The Sierra Nevada is four hundred and fifty miles long (in California) and seventy wide, with a height varying from five thousand to eight thousand feet above the sea-level. Nearly its whole width is occupied with its western slope, which descends to a level of three hundred feet above the ocean; whereas the slope on the eastern side is only five or six miles wide, and terminates in the Great Basin, which is itself from four thousand to five thousand feet above the sea. Nearly all the snows and rains that visit the Sierra Nevada fall on its western slope, which has all the large rivers. These rivers run westward, at right angles to the course of the chain, and cut it into steep hills and deep ravines, cañons, and chasms. The valleys are all small, and it is rare to see a hundred acres of level, tillable land, even on the banks of the largest mountain streams. The greater part of the Sierra Nevada is covered with timber. The oak, manzanita, and nut-pine grow to about twenty-five hundred feet above the sea; and then the coniferous trees appear, and are found in dense forests to a height of six thousand feet.

§ 11. *Rivers of the Sierra.*—The low land of the Sacramento basin, bounded on the west by the Coast Mountains and on the east by the Sierra Nevada, which ranges meet both at the north and the south, is the heart of the State, four hundred miles long by fifty wide, reaching from latitude 35° to 40° 30′. It is drained by two rivers: the Sacramento, running from the north; and the San Joaquin, from the south. They meet and unite in the center of the basin, at 38°, and break through the Coast range to the Pacific, forming the bays of Suisun, San Pablo, and San Francisco, on their way. The valley is nearly level, and thirty feet above the level of the sea at the junction of the rivers, and two hundred feet higher where they issue from the mountains. Part of the Sacramento Valley shows terraces, the farthest from the river being a coarse gravel. The richest soil is on the immediate bank. The great body of the valley is bare of trees. Its even surface is broken in only one place, by the "Buttes," a range of volcanic hills, six miles wide by twelve long, with three peaks, about two thousand feet high, which rise in lonely abruptness from the middle of the plain, in 39° 20′. The general course of the two main rivers of the basin lies nearly midway between the two mountain chains, but almost all their tributaries come from the Sierra Nevada, which, like the Coast Range, has most of its wealth on its western slope. In the four hundred miles from Tejon to Shasta, there are a dozen creeks marked on the map as flowing eastward from the Coast Range to the San Joaquin and Sacramento; but during the summer, three-fourths of them are swallowed up in the sands before reaching their mouths. Not one south of 38° is a permanent stream. From the Sierra Nevada a number of rivers run westward. Beginning at the north, we have the Pit, Feather, Yuba, American, Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, San Joaquin, King's, White, and Kern Rivers—all of them considerable streams, though others in the southern part of the basin are swallowed up in the sands in the dry seasons, before reaching their mouths. The San Joaquin River does not rise at the extreme southern end of the basin, but one hundred miles northward from it, in the Sierra Nevada. After running westward to the middle of the valley, it turns northward. From its bend southward, the valley discharges no water to the ocean during the summer; but in wet winters there are continuous sloughs, or pieces of marsh-like ground, from the Tejon to the San Joaquin. In the dry season, no channel is visible for the escape of the waters of Tulare and Kern Lakes.

The rivers flowing down from the Sierra Nevada are about one hundred and twenty miles long on an average, following their courses. The upper half of their length is in the mountains, where they are torrents, falling five thousand feet in fifty miles. Their beds are in deep cañons; after reaching the plain their currents are gentle, and they meander between low banks, fringed with oaks, sycamores, cottonwood, and willows. In the southern part of the San Joaquin basin there are several large streams, which, soon after issuing from the mountains, divide into a number of channels, as do some large rivers which have deltas near their entrance to the sea. King's River, which is about eighty yards wide where it leaves the mountains, divides into seven or eight channels, which all unite again. The Cahuilla (Kaweah, or Pipiyuma) River, also a large stream, divides into a number of channels, which irrigate "the Four-Creek country," and render it one of the most fertile parts of the State.

§ 12. *Lakes of the Sierra.*—The Sierra Nevada has few lakes. The most notable one is Lake Tahoe or Bigler, about twenty miles long and ten wide, and six thousand feet above the level of the sea, in latitude 39°, and on the eastern border of the State. Part of the lake is in Nevada, and its waters flow eastward into Truckee River. In the eastern part of Nevada County there is a group of two dozen lakes, called the Eureka Lakes, the largest of which is three miles long and a mile wide. In Calaveras County near the summit there is a cluster called the Blue Lakes.

§ 13. *Klamath Basin.*—North of latitude 41° lies the basin of the Klamath River, which rises in Oregon, crosses the Californian line, about eighty miles from the sea, then turns southwestward, and, after a course of about one hundred and fifty miles, empties into the Pacific in 41° 33′. The basin of the Klamath is very rugged, particularly that part of it within forty miles of the ocean. Along the main river there is no valley, or bottom-land; its whole length is between steep hills and mountains, and through rocky cañons. Its largest tributaries, the Trinity and Salmon, run through a country almost as rugged as that bordering the main stream. Scott and Shasta Rivers, which are the only other notable tributaries of the Klamath—they all flow from the southward—have valleys of bottom-land, about five miles wide and forty long.

§ 14. *Enclosed American Basin.*—A prominent feature of the North American Continent is the Enclosed American Basin, a triangular district of country, bounded on the north by the basin of the Columbia, on the east and southeast by the basin of the Colorado, and on the southwest by the Sierra Nevada and Coast Range. This Great Basin—an elevated tract of land, most of which is four thousand or five thousand feet above the sea-level, mountainous, barren, and cheerless, with no outlet for its waters—extends into this State, taking a strip along the eastern border from 34° to 42°. The California portion of the Enclosed Basin is one of the driest and most sterile parts of the earth's surface, cut up by numerous irregular ridges of bare, rocky mountains, with intervening valleys of sand and volcanic scoriæ, and occasional springs and little streams which terminate in lakes, presenting a wide extent of muddy salt water after heavy rains, and in the dry season wide beds of dried and cracked mud, covered with a white alkaline efflorescence. The chief stream in the California portion of the Enclosed Basin is the Mojave, which rises on the northern slope of Mount San Bernardino, and, after running about one hundred miles in a northeastward direction, sinks in the sand. The Mojave receives no tributaries after it leaves the side of Mount San Bernardino. After sinking, it rises again; or rather, pools of water are found in the low places of its bed, the water evidently soaking through the sand and following the bed of the stream. The next stream in importance is Owen's River, which runs southward seventy-five miles along the foot of the Sierra Nevada, and terminates in Owen Lake, which lies in latitude 36° 25′, and is fifteen miles long by nine wide. Northward, one hundred miles from Owen Lake, is Mono Lake, eight miles long and six wide, sometimes called "the Dead Sea of California." No fish can live in the water, which is so heavy with saline substances that the human body floats in it very lightly; though it is so strongly alkaline that it scalds the skin. In the midst of the lake is an island several miles long. While the greater part of the Enclosed Basin is high above the level of the sea, there is a portion of it, called "Death Valley," the sink of the Amargosa River, thirty miles long and ten wide, between 36° 5′ and 36° 35′, three hundred and seventy-seven feet below the sea-level, one of the driest and most desolate parts of that basin of deserts. About latitude 40°, the Sierra Nevada seems to divide or fork—one branch running northward, in the line of the main chain; the other northwestward to Mount Shasta. Between these two branches, and between 40° and 42°, is a high table-land or plateau, about one hundred and twenty miles long, and five thousand feet above the ocean level, belonging to the Enclosed Basin. The main stream in this plateau is Susan River, which after a course of forty miles in an eastward direction, empties into Honey Lake, which is twelve miles long by five wide. Northwestward from Honey Lake, and distant thirty miles from it, is Eagle Lake, about half the size of the other. The land is barren and the vegetation scanty. Pit River starts in the northeastern corner of the State, breaks through the plateau, and empties into the Sacramento, to the basin of which it belongs. North of the river are Wright Lake and Rhett Lake, within five miles of the Oregon line; and Goose Lake and Lower Klamath Lake, partly in Oregon and partly in California. The largest is Goose Lake, fifteen miles long and five wide. Some of the lakes in the Enclosed Basin change their character according to the seasons. After abundant rains they are large, and their water is clear and sweet; after several dry years the waters fall, become thick, opaque and saline, or entirely disappear.

§ 15. *Colorado Desert.*—A district, about seventy miles wide by one hundred and forty long, on the southeastern border of the State, belongs to the basin of the Colorado River. It is usually called the " Colorado Desert," because of its barren, sandy soil, and scanty vegetation. In some places the soil is composed of sand, packed together firmly, with a hard and smooth surface, which reflects light like a mirror; in other places are mountains of loose sand, which are continually shifting. In latitude 33° 20′, and longitude 115° 50′, a district containing 3,000 square miles is seventy feet below the level of the sea. At one time the Gulf of California extended several hundred miles farther north than it now does; and the Colorado River, in long ages, deposited on the western edge of its channel so much alluvium as to make banks down to the present head of the gulf, thus cutting off from its connection with the ocean that part of the gulf now dry. The evaporation in this desert far exceeds the fall of rain; so it was not long before this lake was dried up. When the Colorado River is very high, it breaks over its banks about forty miles southward from Fort Yuma, and sends a large stream, called New River, northwestward, a distance of a hundred miles or more, to the lowest portion of the desert.

§ 16. *Counties.*—California has fifty-three counties. Those in the northern half of the State, are Del Norte, Klamath, Humboldt, Mendocino, Modoc, Sonoma, and Marin, on the coast; Lassen, Sierra, Nevada, Placer, El Dorado, and Amador, on the eastern border; and Shasta, Siskiyou, Trinity, Tehama, Plumas, Butte, Colusa, Yuba, Sutter, Lake, Yolo, Napa, Solano, and Sacramento, inner counties.

In the southern half of the State, are San Francisco, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Los Angeles, and San Diego, on the ocean; Mono, Inyo, and San Bernardino, on the eastern boundary; Calaveras, Tuolumne, Mariposa, Fresno, Tulare, Kern, San Joaquin, Stanislaus, Merced, Contra Costa, Alameda, San Benito, and Santa Clara, which do not reach to the border. San Diego reaches entirely across the State, and is the only county that does.

§ 17. *Maps.*—Among the maps prepared by C. F. Hoffmann, of the State Geological Survey, and executed in the finest style of topographical work, and with great accuracy, are the following:

1. A map of Central California, on a scale of six miles to an inch. It covers an area three hundred miles square, its northern line being beyond Lassen's Peak and Cape Mendocino, its eastern beyond Owen Lake, its southern beyond Visalia and Point Sur, its western beyond Point Reyes. All that part of this region in California has been carefully surveyed by the State Geological Survey, except a little strip in the Coast mountains north of Clear Lake. The scale of the map is six miles to an inch, and the style of execution is superior to that of any other map ever made in the New World, of a State, or any large area. This map is published.

2. The triangle south of Central California, on the same scale, with equal thoroughness. Its northern and eastern sides are about two hundred miles long, and its southern and western boundaries are the ocean. This map is to be published soon.

3. The Bay map, covering an area of sixty-six by ninety miles, extending from Napa to Gilroy, and from Livermore Pass to Olema, on a scale of two miles to an inch, has been published. It shows the latest municipal lines, the town plats, the surroundings, and the completed railroads, in addition to the topography and the depth of the waters.

4. The Yosemite region, covering an area of forty by fifty-eight miles, on a scale of two miles to an inch. Published.

5. The Yosemite grant, on a scale of two inches to a mile. Published.

6. California and Nevada, on a scale of eighteen miles to an inch. Published.

7. A geological map of the gravel range across Nevada and Placer Counties, to be done probably in three months; and a geological map of the peninsula of San Francisco. Not yet published.

CHAPTER II.

SOCIETY.

§ 18. *Population.*—In population, California is the twenty-fourth State of the Union, but in the absolute number of Chinamen it is the first, in Mexicans and Russians second, in Spaniards the third, in Poles and Danes the fifth, in French the sixth, and in English, Scotch, and Irish the ninth. About one-seventh of the people of the United States, and four-elevenths of the Californians, were born abroad.

According to the Federal census, the population of California was, in 1870, 560,247 ; and since that year no census has been taken of the entire population in any part of the State, nor of any class save that of the children counted for school purposes. In 1872, the children under sixteen years of age numbered 207,084, indicating an increase of 22,394 in two years, or more than 11,000 annually. Of these 207,084, 69,723 were under five years of age, and 137,361 between five and fifteen inclusive. We may assume safely that in each of those two years 8,000 children passed beyond the school age, so that the entire natural increase was 38,394. We know also, by the statistics kept by the Custom House of San Francisco and the Central Pacific Railroad Company, that in the three years and a half between the 1st of July, 1870, and the 1st of January, 1874, the excess of arrivals over departures by sea and rail was 65,000 persons. After allowing for deaths, the population of the State at the end of 1873 was about 641,000, if the census of 1870 was correct. It is certain, however, that much of the census work was done inefficiently, and there is good reason to believe that the true population of California in 1870 was not less than 590,000, and on that basis the present population would be about 680,000.

§ 19. *Nationalities.*—The census of 1870 contains many details which may be regarded as approximately correct; and we must accept it because nothing of the same kind is to be found in any other authority. Our attention is first attracted to the matter of nativities, and here we find that 350,416 of the Californians in 1870, were natives of the present territory of the United States; and 209,831 were foreign-born. Among the foreigners, we find the following numbers, viz: 54,421 Irish, 48,826 Chinese, 30,777 Germans and Austrians, 22,644 English, 12,195 British Colonists, 9,380 Spaniards and Spanish-Americans, 8,063 French, 4,660 Italians, 2,944 Scandinavians, 2,495 Portuguese, and 1,344 Russians and Poles.

Among the Austrians are several thousand Dalmatians from the shores of the Adriatic; and they are the majority of our citizens of Slavonic blood. Counting the Germans, British, British-Americans, and Scandinavians together, we have 68,560 foreigners of Teutonic blood, 54,421 Celts (assuming that the Irish are all of Celtic blood), and 25,048 Latins, including under that head all the Spaniards, Spanish-Americans, French, Italians, and Portuguese.

Of the 350,416 natives in California, 169,904 were born in the State, leaving 180,512 natives of other parts of the Union; and of these, 47,792 were born in the Southern or ex-slave States, and 132,720 in the Territories and Northern States. New Yrok contributed 33,766, Missouri 16,050, Massachusetts 15,334, Ohio 12,735, Maine 11,261, Pennsylvania 11,208, and Illinois 10,689.

§ 20. *Occupations and Sexes.*—The number of people reported as being engaged in occupations in 1870, was 238,648, including 224,868 men, and 13,780 women. Of the total, 47,863 were engaged in agriculture, 76,112 in personal and professional duties, 33,165 in trade and transportation, and 81,508 in mechanical and mining industries.

The entire number of males and females is not reported in any volume of the census yet published, but we have the figures for those persons aged ten years or more, and among those we find 283,740 males, and 146,704 females. We know, however, that there were 184,000 children under sixteen, in the State in 1870; and as among them the two sexes were equally divided, it follows that there were, in 1870, 263,000 males, and 126,000 females over sixteen in the State, or two to one. After deducting 48,000 Chinamen, we find that there are eight males to five females among the whole population over sixteen, and that 90,000 white men can find no mates in the State.

The native males number 199,421, including 64,203 between five and eighteen years of age, 77,828 between eighteen and forty-five, and 93,327 adults. The foreign males number 150,058, including 6,883 between five and eighteen, 117,107 between eighteen and forty-five, and 133,929 adults.

There are 150,995 native females, and 59,973 foreign females.

§ 21. *Other Classes.*—There are 128,752 families in California, averaging 4.35 persons each, and 126,307 dwellings, averaging 4.44 persons each. The adult male citizens number 145,802, and 94,738 votes were cast at the presidential election in 1872, showing that in that year 51,064 voters, or more than 35 per cent., stayed away from the polls. The proportion of voters who did not go to the polls was unusually large in that year, the supposition being that at presidential elections ordinarily about nine-tenths of the voters cast their ballots.

The paupers number 991, including 637 foreign and 354 native.

The convicts in prison were 1,574, 906 of them foreign and 668 native. The number convicted in the year was 1,107.

§ 22. *Decline of Mining Counties.*—The population reported in 1860 was 379,944, showing a gain, in ten years, of 176,669, or 46 per cent.

The general gain of the State is very unevenly distributed, and there are some serious losses, especially in the mining counties, of which the following may be taken as samples:

Counties.	1860.	1870.
Calaveras	16,209	8,896
El Dorado	20,562	10,326
Mariposa	6,243	4,572
Sierra	11,387	5,337
Trinity	5,125	3,173
Mokelumne	16,226	8,171
Total	82,842	40,475

Here is a loss of 42,366 inhabitants in six counties, or more than half the total population which those counties had ten years ago. The loss in productive power is still greater, for there is a much larger proportion of women and children now than in 1860. Placer shows a loss of about 15 per cent.; Siskiyou of 10; and Yuba (which formerly had rich placers) of 20. Del Norte, Klamath, Plumas, and Shasta, other mining counties, show no change worthy of note. Amador and Nevada, which have the most profitable quartz mines of California, have gained, the former 10, and the latter 16 per cent.

The largest relative gain has been in some of the smaller agricultural counties, such as Colusa and Humboldt, which have each added 200 per cent. to their population in the decennium. Stanislaus, San Luis Obispo, and San Francisco gained 180 per cent.; Sutter, 170; Merced and Alameda, 150; Solano, 125; San Joaquin and Santa Clara, 120; Santa Barbara, San Mateo, Monterey, Yolo, and Marin, 100; Mendocino, Santa Cruz, and Sonoma, 75; Contra Costa, 60; Fresno, 50; Los Angeles, 35; Napa, 28; Sacramento, 12; Butte, (which is now mainly agricultural) 9; and San Diego, 8 per cent. There was a loss of 28 per cent. in San Bernardino; 20 in Tulare; and 10 in Tehama. The loss in San Bernardino, and the smallness of the increase in San Diego, are probably due mainly to the disappearance of Indians, of whom 3,000 were reported for each county in 1860.

The growth in the agricultural districts of the San Joaquin Valley has been large. We put the following counties together:

COUNTIES.	1860.	1870.
San Joaquin	9,435	21,064
Stanislaus	2,245	6,510
Merced	1,141	2,810
Fresno	4,605	6,336
Total	17,426	36,720

Here is an increase in the district of more than 100 per cent.

There are 53 counties, of which 18 are mainly mining, and 35 agricultural and commercial. The total population of the mining region is 105,314, or an average of 5,861 to the county. The agricultural and commercial districts have 451,299 inhabitants, or an average of 14,031 to the county. San Francisco has 27 per cent. of the inhabitants of the State, or more than the entire population of the mining region. Sacramento, Santa Clara, Alameda, San Joaquin, Sonoma, and Nevada, are the next counties in order, and together they have about one-fourth of the population of the State, and with San Francisco they have more than the remaining 46 counties.

§ 23. *Cosmopolitanism.*—Not one in twenty among the adult Californians to be met with in the larger towns is a native of the State, and nearly all those who occupy prominent and influential positions in society and business have come from distant homes. Every State in the Union, every country in Europe, all the British Colonies in North America and Australasia, all the countries of Spanish America, and many of the

Polynesian Islands, are represented. The long and costly journey demanded either money, an adventurous disposition, or both. The people as a class are unequaled in their general intelligence and enterprise. The journey in pioneer times was sufficient in itself to educate a man, and after his arrival here he found himself among a mixed population, who had to make allowance for strange customs, and in new conditions which required new modes of working and new habits of life. The migratory habits of the miners, the large profits of business, and the small proportion of women, have all exercised a strong influence on California society, which, even among the poorest and most ignorant class, has a liberal and cosmopolitan tone.

§ 24. *State Pride.*—The Californians who have been here from fifteen to twenty-five years are proud of their State, and carry their pride so far that it is observed as something exceptional in the United States. The causes of this feeling are: satisfaction with themselves for their share in building up the State, and with the rapidity with which it has advanced; the recollection of the wonderful changes that have occurred here within a quarter of a century, and of the impressive events in which they have taken part; and profound convictions that this is in many respects the best place in the world for the enjoyment of life, that its attractions are not generally understood in the Eastern States and Europe, that it is destined to have a prosperous and glorious future, and that it will be a chief pleasure resort and a center of the highest civilization. To many of the pioneers, existence would lose its zest and romance, and would become a dull drudgery, if they were compelled to make their homes east of the Rocky Mountains. A large proportion of those who have left the State, intending to spend the remainder of their lives in their native places, have returned, declaring that they could not accommodate themselves to the slow, quiet, dull ways of more antiquated States.

W. F. Rae, in his *Westward by Rail*, thus exaggerates and caricatures the State pride of the pioneers:

"The love of Californians for their country has been absorbed in a singular and exceptional affection for their State. * * They appear to live under the delusion that the rich gold mines, the unrivaled grain, the magnificent fruit, the delightful climate, are all creations of their own. Tell them * * that nature has been as kind to dwellers in other portions of the globe, and they will appear to think an affront is intended."

This ridicule loses its edge when we read elsewhere in his book, that this is "the land of perpetual sunshine," and "it is not surprising that those who have lived in California should be reluctant to leave it, and, after having gone elsewhere, should long to return thither." Californian miners have wandered off in considerable numbers to British Columbia, Montana, Nevada, Utah, and Arizona, but the Golden State holds a warm place in their affection, and they call it "God's Country," a title full of eloquence as well as of endearment. And if Californians over-estimate the value of their State, it should be remembered that they have a right to speak as experts, for no others have seen more of the world, or had better opportunities to make a fair comparison.

§ 25. *Hospitality.*—It is, perhaps, partly on account of their State pride, that the Californians are cordial and hospitable. They want travelers to carry away good impressions of the country. Since the completion of the trans-continental railroad, many residents of the Eastern States have come to visit their Californian relatives, and they have carried back glowing accounts of the generous welcome given to them. In the numerous books on California, much is said of the hospitality of the people. One gentleman, connected with the Bank of California, has been so magnificent in the entertainment of strangers, that an absurd rumor was published that the Bank allowed him $150,000 annually for that purpose; but such a story would not have been started about any other State. The hospitality of the Californians is in keeping with their general mode of life. They live for enjoyment, and expect to expend most of their money as it comes. They have traveled enough to know how to entertain, and how to accept entertainment. C. L. Brace, in his *New West*, says: "The great virtues of Californian society are its intelligence, its energy, and above all, its generosity."

§ 26. *Luxurious Living.*—The enjoyment of life is a prominent purpose of Californian society, while religion, social display, and the accumulation of money are less noticeable than in most other countries. The prevalent mode of living is luxurious, and the habits are extravagant. While many fine fortunes have been made in the State, in comparison with the number of inhabitants, yet a large proportion of those having excellent incomes save relatively little, preferring to enjoy their gains as they go along. The houses generally are furnished elegantly; the tables are supplied with a variety of the best kinds of food; and the clothing is of costly material. The traveler observes that the dresses of the ladies on Kearny Street are richer in stuff and color, and less pretentious in their cut and trimming, than those of Broadway. When people come to California they expect to better their condition, and they are not content to live as they lived before coming hither. They are often extravagant, and seldom miserly.

§ 27. *Social Equality.*—In no place is society more free and cordial, and ready to give a friendly reception to a stranger, than in California. The new-comer is looked upon with favor; nobody cares whether he belongs to a distinguished family, has moved in a fashionable circle, or possesses wealthy or influential friends or relatives. The great question is, "Is he or she well educated, polished, and entertaining?" Of course, Californians are not entirely above such considerations as govern society elsewhere, but they are influenced by them far less than people in other States. The course of business is such that no profession has all the wealth. There are rich men of all occupations, and some of the mechanical trades are now as profitable, on the average, to those engaged in them, as are the learned professions. Those who were rich in the older States, and received a thorough education and a polished training, may here be poor, while those who came hither poor and ignorant may now be rich. Besides, the changes are so rapid that our neighbor who is poor to-day may be rich to-morrow, and the neighbor who is rich to-day may be poor to-morrow. Again, California is preëminently a country of business. People come here to make money, and everybody tries to make it; and in a State where wages are high, and profits large, a man's business depends to a considerable extent on the multitude of his friends, so everybody wishes to make a friend of everybody else. The millionaire in Europe may treat his tenant as an inferior; in California the wealthiest land-owner is expected to treat his tenant as an equal. All these things have their influence in preventing the separation of our society into those classes which prevail elsewhere.

In no part of the world is the individual more free from restraint. High wages, migratory habits, and bachelor life, are not favorable to the maintenance of stiff social rules among men; and the tone of society among women must partake, to a considerable extent, of that among men, especially in a country where the women are in a small minority, and therefore are much courted. Public opinion, which as a guardian of public morals is more powerful than the forms of law, loses much of its power in a community where many of the inhabitants are not permanent residents. A large portion of the men in California live alone, either in cabins or in hotels, remote from women relatives, and therefore uninfluenced by the powers of a "home." Many girls commence going into "society" about fifteen, then receive company alone, and go out alone with young men to dances and other places of amusement.

Charles Nordhoff pays Californians the following compliment:

"I do not know whether to ascribe it to their varied employments, or to the fact that the State was settled originally by a picked population, the most energetic and resourceful only coming here, and of these again only the ablest achieving success and remaining here; but it is a fact, that I was struck with the high character of the population, in all parts of the State I have seen, for intelligence, enterprise, and activity. 'Chicago and San Francisco are the only two cities you can find in the whole country which will remind you of New York,' said a friend to me, whom I met in Chicago. I think he is right. Philadelphia, Boston, Cincinnati, and other large cities, differ in many ways from New York. All of them seem 'slow' to one accustomed to the rush and whirl of New York business life. But such a person finds himself at home in either Chicago or San Francisco. In both he finds the same activity in the streets; California Street, in San Francisco, during business hours, is so much like our own Broad and Wall Streets, that when I first saw it I had no need to ask what was done there. The business men of San Francisco move, talk, dress, dine, and carry on affairs like New Yorkers; some of them drink a little more whisky—that is the only apparent difference between them. They are as accessible to strangers, as readily hospitable, and as little formal as New Yorkers; and what is true of San Francisco is equally true of the whole State. A banker, lawyer, or merchant, anywhere we have traveled in California, might be, for aught you could tell from his appearance or language, dress or address, just from New York. You would not take him for a Bostonian or a Philadelphian; and I did not notice on any person that peculiar air or dress which, with us in the East, proclaims a lawyer or business man from the interior. I think it was Donald G. Mitchell who complained that no man could live two years out of New York, no matter how well informed he might be, or how excellent his tailor, without betraying himself to a New Yorker as a countryman. Well, here in California I met dozens of business and professional men whom I should have taken anywhere for New Yorkers—men as fresh in their thoughts, as ready, as though they had only the day before left Broadway or Wall Street.

"It is the same with their houses. They receive you, they dine or lunch you, they entertain, as though they were New Yorkers. Of course, the climate leads them to a different style of building; but when you are once indoors you are as much at home, and find the ways of the house, the mode of life, and the tone of conversation, as familiar to you as though you were at home. I met no 'rusty' people in all California."

An American correspondent of a London paper said:

"All Englishmen with whom I have talked agree that there is a marked difference between Californians and other Americans, and in favor of the former. It comes out, I think, most clearly in the manners of the lower classes, who have a certain frank courtesy that I have not met elsewhere in the States. One explanation is that California has been settled by picked men from all countries in the world. * * * The pleasanter side of such deference to a stranger's feelings is a self-respect which makes the lower classes in California among the most agreeable companions I have known anywhere in a corresponding class."

§ 28. *Physical Characteristics.*—Of the Americans in California, it may be remarked that they generally have the same marks as the Americans in the Eastern States. Their eyes are deep set, their foreheads high, their features regular and finely cut, their faces expressive and free from grimace, their complexions sallow, their lips thin, their mouths grim, their bodies tall, slim, and slightly bent in the shoulders, their chests thin, their voices harsh, and their enunciation slow and clear, with little modulation. These general characteristics, as compared with Europeans, are common among the natives of the Atlantic States who came to California after reaching adult age; but there is an evident change in those who came young to the

State, or were born here. The typical Californian of the next generation will be plump, ruddy in complexion, full in the chest, and melodious in voice. In other words, he will resemble the Briton more than the Massachusetts man. Even among those natives of the Eastern States who have come to California as men and women, there is much change. Many of them have lost their sallow complexions and thin figures, and when they return to their brothers and sisters in the East the contrast attracts attention immediately. Age does not show so rapidly in California. Our women as a class are considerably heavier than in New York, and the sizes of corsets and shoes sold there are too small for the main demand of the San Francisco market. Many English tourists, writers of books, have observed the physical peculiarities of Californians as compared with other Americans; and among them is W. F. Rae, who wrote thus:

"From points about which travelers differ it is a pleasure to turn to one about which there has been and must be perfect unanimity. The beauty of the women is without the pale of controversy. It cannot be likened to the beauty for which English girls are universally and deservedly admired; for which Italian maidens have been immortalized on canvas or in verse; for which the sprightly damsels of France, and the coquettish ladies of Spain, have won applause, and by means of which they have won conquests. If I were to select a particular locality in the United States, I might truthfully compare the type of beauty predominant there to that of a particular country in the Old World. But America is a world in itself. Within the bounds of the Republic of the West are all climates which give diversity to Europe, from Rome to Copenhagen and from London to Madrid. Where climates vary, female faces vary also. In New England, may be seen those delicately chiseled features and transparent complexions which in Europe are characteristic of the fascinating beauties of the North. In the Southern States, the imperious and indolent

Spanish women, with their amorous eyes and raven hair, have been reproduced at a distance of many thousand miles from Andalusia and Castile. Let the traveler cross the continent till the Pacific slope is reached, and there the soft and delicate beauty of Italy, combined with an intelligence wholly American, and a physique wholly English, delights and surprises you. Nor are good looks the sole dower of the American girls. They are more French than English in the acuteness with which they argue. They are passionately fond of the frivolities of existence, yet they follow with interest the course of the graver topics of the day. * * * * * * * *

"The children are healthy and robust. Their rosy cheeks are a great contrast to the transparent skins and pale complexions of New England children. If the child be a criterion of the man, the native-born Californians will hereafter be fine specimens of humanity. * * The physical conditions under which human beings exist in this favored region, are well adapted for imparting to them the qualities which lead to greatness in all departments of exertion."

In his book entitled *Across the Continent*, Samuel Bowles says:

"The indications are that the human stock will be improved both in physical and nervous qualities. The children are stout and lusty. The climate invites, and permits with impunity, such a large open-air life that it could hardly be otherwise."

Another traveler, C. L. Brace, thus records his impressions:

"The population will be the most industrious working population of the world. * * Such is the wonderful quality of nature here, and the selected energy of the Americans, that the five hundred thousand [Californians] are equal to millions elsewhere. * * It is the land of handsome men. * * The young girls of the city [San Francisco] show a great deal of beauty, and such rich bloom of complexion as we seldom see on the Atlantic border. The Coast will no doubt be merely the American type improved. * * I am constantly meeting young, ruddy, round-faced business men, whom I mistake for Englishmen, but they are Yankee-born."

Robert von Schlagintweit, a distinguished German traveler, says:

"The visitor from the Eastern States of America immediately observes the fresh appearance of the Californians; and is astonished at the healthy complexions and light red cheeks, which are rare in his former home."

These quotations are inserted here not only to confirm my own statements, and give additional authority to them, but also to show how strongly travelers are impressed with the evidences that a race of peculiar physical character, or at least different from and superior to those of the Atlantic States, will grow up here. I have not found anywhere an adverse opinion.

§ 29. *Publicity of Life.*—Life in California is very public. Many of the people live in hotels and at large boarding-houses. Travelers are numerous; theaters and balls are abundant and well attended; celebrations and festivals are frequent; the population is excitable; all take the newspapers, and all are interested in the events of the day; and the history of the country is full of eventful incidents, which always present fruitful topics for discussion. Money is abundant, and is easily earned, and of course it is spent freely; and the favorite method of spending is in public festivities and attending places of amusement. The regularity of the summer climate enables people to make journeys, excursions, picnics, and parties, without fear of rain or preparation for it. In the winter the people are not shut in by the cold; and at San Francisco the coolness of the climate is a constant stimulus to exercise, and an invitation to go into the street. Dancing parties are common throughout the year. Numerous national, secret, and benevolent associations, Sunday-schools, and military companies, must have their annual picnics, while others have their periodical festivities in the form of balls. But perhaps the amusement which has found the most favor in California is billiard-playing. Billiard-tables are found everywhere. In many little villages where there is but one inn a fine billiard-table will be found. In San Francisco there are numerous large billiard-saloons, containing each from eight to twelve of the largest and most elegant billiard-tables, at which men are constantly playing.

§ 30. *Education.*—California has an excellent system of State schools, open without charge to all children between five and fifteen years of age; and the system of instruction and the general management of the departments are reported to be little, if in any manner, inferior to those in Massachusetts. The teachers are mostly natives of the Eastern States, and are highly capable. The intelligence of the people who settled the State will be transmitted to their offspring, and there is no probability that the Californians of 1900 will be less intellectual than those of 1870.

Out of 135,361 children of school age, 72,972 go to school, and the average daily attendance is 65,700. There are 1,612 schools, and 2,301 teachers, of whom 1,420 are ladies. The total expense to the public treasury is $2,131,783 annually. There are 88 school libraries, with 200,000 volumes.

The public libraries of the State, in addition to those belonging to the schools, number thirty, with 300,000 volumes, including the Mercantile of 30,000, Mechanics' of 20,000, and the Odd Fellows' of 18,000, in San Francisco.

A State University has been liberally endowed by the State and has been organized, but as yet it deserves to be called a college. It has a small library, no laboratory, and few professors and students; but it has a magnificent site, and means which, if properly managed, would enable it to become a great institution. Much of its money has been squandered, however, and the result for the future is doubtful. Sectarian colleges are scattered along the coast from Santa Rosa to Santa Barbara, most of them small affairs. Those of the Jesuits have the best buildings and apparatus and the largest number of students and professors. Many of the non-Catholic parents send their sons and daughters to Catholic schools.

§ 31. *Literature.*—California has made a beginning in the establishment of a local literature, but her writers were nearly all born elsewhere, though they first resorted to authorship here, and were impelled to it by our intellectual atmosphere. The only native of the State who has ventured into print is a lady of Spanish blood, and she did not make a success. The Californian books include law, history, geography, religion, biography, science, romance, poetry, and humor. H. W. Halleck's *International Law*, Gregory Yale's *Water Rights*, Franklin Tuthill's *History of California*, John W. Dwinelle's *Colonial History of San Francisco*, Frank Soulé's *Annals of San Francisco*, T. F. Cronise's *Natural Wealth of California*, T. H. Hittell's *Adventures of James Adams*, A. S. Evans' *Our Sister Republic*, John F. Swift's *Trip to Jericho*, John F. Derby's *Phœnixiana*, Mark Twain's *Innocents Abroad*, and Bret Harte's *Condensed Novels*, deserve special mention. Derby, Mark Twain, and Bret Harte are accounted deservedly as among the leading humorists of the age, and Swift, in his *Jericho*, has shown much humorous power. Ina Coolbrith, C. W. Stoddard, Emily Lawson, Edward Pollock, Joaquin Miller, and many others, have made valuable contributions to the poetry of the Pacific.

§ 32. *Art.*—Our artists, like our authors, have all come from abroad, and yet they feel as if they belonged here as much as if born here. Some of them came hither without skill or reputation and rose to eminence among us; others, who had gained reputation in the East, came and made their home by preference in California, on account of the attractions of its climate and scenery. Landscape has been the branch of most of our artists, and has been carried to a high degree of excellence. Thomas Hill is a master in general effect, relief, effective arrangement of light and shade, and fine harmonies of contrast and color; and in these prominent points I have not yet seen any pictures superior to his. Wm. Keith has similar merits, but both paint in the same broad style, and omit much desirable finish of detail. In this respect, Bierstadt, who does not claim to be a Californian, but has spent much time here, is superior to either. Virgil Williams is another landscape painter of much skill. The only historical painter is Charles Nahl, whose works possess remarkable excellence in vigor and suggestiveness of design. In accuracy of drawing, strength of light and shade, careful finish, and brilliancy of color, he ranks high. His picture of "Sunday in the Mines in 1849," of exhibition size, representing a mining camp, with horse-racing, with men bible-reading, writing home, washing, quietly resting, gambling, and fighting, is enough to make a reputation. He is fond of bright sunshine, and he makes it glare with all the brilliancy of midday under a California sky. Wm. Hahn, an excellent figure painter, has not yet determined to make his permanent home here. S. M. Brookes, as a painter of still life, is unsurpassed on our continent.

The Art Association of San Francisco has taken a firm foothold and given some very creditable exhibitions, and it promises to become the nucleus of a permanent art-school.

§ 33. *Religion.*—In 1870, California had 643 religious congregations, 532 houses of worship, and seats in them for 195,000 persons, or space for about one-third of the population. The property of these congregations was valued at $7,404,000, or about $13,000 for each church, on an average. The Catholics have 144 churches, 66,000 seats, and property valued at $4,600,000, or more than one-fourth of the churches, one-third of the seats, and one-half of all the church property in the State. The Methodists have 155 churches, the Baptists 115, the Presbyterians and Congregationalists 95, the Episcopalians 38, and others smaller numbers. The Jews have seven, the Mormons three, and the Spiritualists two. The people generally are not strict in their adherence to ecclesiastical regulations. Most of them rarely go to church, and many of those who go are not communicants. Church membership is not generally supposed to be inconsistent with the round dances, theater-going, or card-playing. The Americans generally are nearly all Protestants by education, but they wear their faith loosely, and lean to indifferentism, if not skepticism. The great majority of the Germans are more skeptical than the Americans. The Italians and French adhere nominally to the Catholic Church, but show no zeal. The foreign-born Irish have brought their zeal with them, and preserved it pretty well; but the new generation are affected to a considerable extent with the spirit of indifferentism, and the church, notwithstanding it gains some converts from the Protestant sects, which win none in return, is losing influence relatively, notwithstanding its numerous schools, in which the dogmas of the church are instilled into the minds of the people with great care. Secret associations, mainly benevolent and social in their purposes, occupy a prominent place in California; and in many of the mining towns the Odd Fellows' and Masonic lodges are more costly and commodious than the churches, and the feeling of attachment to these Brotherhoods is akin to religion.

The Odd Fellows, the strongest secret order in the State, have 200 lodges and 14,000 members; gain 1,000 members every year; collect $300,000 of revenue, and spend two-thirds of the sum for the relief of needy members.

The Free and Accepted Masons have 187 lodges and 10,000 members, and gain about 800 annually.

The Improved Order of Red Men has 40 lodges and 2,600 members.

The Independent Order of Red Men, the Knights of Pythias, the Order of Druids, the Order of Heptasophs, are other associations, mainly benevolent.

The Fenian Brotherhood, the Ancient Order of Hibernians, the United Order of American Mechanics, the United Order of White Men, the American Protestant Association, the Order of the Crescent, and the Grand Army of the Republic, have political and benevolent purposes.

The B'nai B'rith, and the Ancient Jewish Order of K. S. B., are societies of mutual benevolence, open to Jews.

The Patrons of Husbandry, recently organized, has about 7,000 members. Its avowed purpose is to advance the interests of the agricultural community.

§ 34. *Deeds of Blood.*—Twenty years ago, California had a sad notoriety for deeds of blood, and for lynch executions; but as society has become more settled, murders and illegal punishments have become rarer, and are perhaps not more common now than in some States east of the Rocky Mountains. The abundance of treasure, the necessity of transporting it for long distances over mountainous roads, and the sparseness of the population, offer opportunities for robbery seldom found elsewhere, and they are not entirely neglected. The stage robbers are usually gentlemen in their way; and they generally content themselves with taking the box of treasure sent by the express company, neither robbing nor insulting the passengers when they find that the express box is empty, and that they have risked their lives for nothing. Even when homicides were most frequent, the great majority of the people were secure in their lives and property; but the percentage of deaths was large among the gamblers, drunkards, holders of disputed land claims, thieves, and borderers. Public gambling was tolerated by law until 1854, and by custom in the mining towns ten years later. Dueling was common. The Indians were a degraded and drunken race, and caused much bloodshed. The great injustice done by the government, in preventing the people from getting secure titles to either the agricultural or mining lands, led to numerous quarrels, and many fatal affrays. The scarcity of women was another source of trouble. In all these respects there has been great improvement, and our larger towns are little inferior to those of Illinois in the security of life and the maintenance of public order.

Yet in the most disorderly times, the great majority of the people were peaceful, quiet, and firmly hostile to all forms of crime. The pioneers, as a class, would have been a credit morally to any country; and the ideas to the contrary have been circulated mainly by writers who were not here previous to 1853.

California has been a favorite subject of exaggeration. A romancer who wants to make a sensation, tells a big story about our State, with no purpose that it shall be taken as true; but somebody else imagines it to be the fact, draws it up in a new form, and it then passes as established truth. It must be in this manner that Herbert Spencer, one of the most learned and able men of the day, has lately been misled. The *Popular Science Monthly* for June, 1873, contains a paper from his pen, and in its course he says:

"I do not refer only to such extreme illustrations of it as were at one time furnished in California, where, along with that complete political freedom which some suppose to be the sole requisite for social welfare, most men lived in perpetual fear for their lives, while others prided themselves on the notches which marked, on the hilts of their pistols, the number of men they had killed."

Unfortunately for Mr. Spencer, his illustrations are false. I have lived twenty-five years in California, part of the time in the mines, have all the time been familiar with the general condition of society throughout the State, and can safely say that never was one man in a hundred "in perpetual fear of his life," nor in any fear once a year. Men who have attended to their own business, kept sober, avoided gambling houses and disputed land titles, and acted honestly, have always been comparatively safe. I do not remember that any Californian murderer ever prided himself on the notches on his pistol marking the number of his victims, nor could boasts of murder have been made with impunity in any part of the State.

Bret Harte's representations of the manners of the miners of California are very entertaining, and they do not claim to be anything save romance. He and Clarence King have both undertaken to write about pioneer life in the mines of California, without personal knowledge or careful investigation, which was not required of the novelist, but would not have been out of place in a work recording observations taken during an official geological survey.

Previous to 1856, street fights were among the institutions of San Francisco. It would frequently be announced by conversation, or even by the newspapers in the morning, that a street fight might be expected that day, between two men whose names were mentioned; and the curious would collect on the main business street, to see the fun. The belligerents would walk along the street, and on coming near each other would draw their revolvers, and, with or without speaking, commence firing. The fight would be one of self-defense on both sides. In the use of deadly weapons, California resembles the Gulf States far more than the North. The wild condition of affairs in the early times was impressed upon our society, and we have not yet been able to reform it altogether; and in the matter of carrying deadly weapons, and in street fights, we have imitated the example of the Cotton States. So, too, in the matter of duels, of which there have been many in California, and some of them of a character so remarkable as to attract attention all over the civilized world. Dueling is punishable as a felony by severe penalties; but a hundred duels have been fought in the State, and about one-third of them have proved fatal to one of the principals, and yet no man has been legally punished for dueling, nor has any one been prevented from voting or holding office for that reason; on the contrary, many of the duelists have held offices among the most honorable and profitable in the State. Public opinion, which is more potent than the law, has condemned duels, and we have not had one for years.

§ 35. *Dialect.*—Bret Harte has attributed to the miners of California a peculiar, strongly-marked, and affected dialect, but he has drawn on his imagination for the greater part of it. A mixed population, like that in the mines, representing every State in the Union, and every county of Great Britain, could not have a dialect; and nowhere is the English language better understood, or spoken with more force, elegance, and purity, by the poorer classes of people, than in this State. Harte did not come to California until 1857, never lived in the mines, and had no habits of research, nor was it necessary that he should have for success in his department of literature. Slang, as distinct from dialect, is common in California. Mark Twain had excellent opportunities to become familiar with it, and he has made a singular and amusing collection of it in an account of "Buck Fanshaw's Funeral."

§ 36. *Californianisms.*—The Californians have introduced certain words into the English language, or at least have adopted them in common use in the State, and a list of them, with their pronunciation and definition, may not be out of place here:

Aparejo, (a par ay′ ho) a Mexican pack-saddle.

Adobe, (a do′ ba) a large, sun-dried, unburned brick, sometimes two feet long, a foot wide, and four inches thick.

Arroyo, (ar ro′ yo) a brook, or the dry bed of a brook or small river.

Arastra, (a ras′ tra) a primitive mill for crushing quartz.

Alforja, (al for′ hah) a bag, usually made of raw cowhide, used for holding the articles to be carried by a pack-horse.

Bar.—A low bank of sand or gravel, at the side of a river, deposited by the stream.

Bummer.—An idle, worthless fellow, who does no work and has no visible means of support. The word "loafer," like "lounger," does not designate the general conduct or permanent character of a man, but only a temporary idleness. A respectable, industrious man may become a "loafer" by making idle, impertinent visits in business places during business hours; but the word " bummer " implies a low, lazy character. It is probably derived from the vulgar German words *Bummeln* and *Bummeler*, which are about equivalent to " loafer " and " loaf." Its origin has been attributed to *Boehmen*, the German name of Bohemia, a nationality celebrated for the number of its sharpers and adventurers. The Gipsies are called *Bohemiens* in France, because of their roving lives and worthless character. " Bummer " is generally supposed here to be a Californianism.

Bumming, acting the bummer, used in such phrases as " he is bumming around."

Caballada, (ca bâl yah′ da) a herd of broken horses.

Cañada, (can yah′ da) a small cañon, a deep ravine, a narrow valley with steep sides.

Cañon, (can′ yon) originally a tube, and hence applied to mean a deep gorge with high, steep walls. Comparatively few cañons and cañadas are to be found in that portion of the United States east of the Mississippi, but they are abundant in California. The Spaniards place the accent on the last syllable of cañon, (can yone′) but in ordinary American usage the accent is on the first syllable. It is frequently spelt " canyon," and " kanyon."

Corral, (cor ral′) a pen into which a herd of cattle or horses is driven, when one is to be caught.

To corral, to drive into a corral; to drive a person into a position from which he cannot escape.

To coyote, a mining term, to dig a hole resembling the burrow of the *coyote*, or small Californian wolf.

Claim, the tract of land claimed for mining purposes by a man or party. There are various kinds of claims, such as bank, bar, hill, tunnel, flat, etc.

Color, a visible quantity of gold found in prospecting. If the prospector finds one or more particles of gold in his search, he says he has found the *color*.

To dry up, a slang phrase, meaning to stop, fail, disappear, become silent. It is very expressive to Californians, accustomed to see the whole face of the country dry up in the summer season.

Diggings, a general name for placer gold mines. *Wet diggings* are in the banks and bars of creeks or rivers; *dry diggings* are in flats or the beds of gullies, which are dry the greater portion of the year.

Espediente, the original papers relating to some government business, filed in a public office.

Embarcadero, (em bar ca day′ ro) a landing place.

To freeze out, a miner's phrase, used to express the policy whereby stockholders, or partners in mines, are driven to sell out. For instance: if some rich men, owning part of a mine, discover that it is very valuable, they may conceal that fact, and at the same time levy heavy assessments for works which can bring no speedy return; and thus the poorer shareholders will be burdened and discouraged, and induced to sell out at a low price.

Fuste, (foos′ te) a strong saddle-tree, made of wood, and covered with raw cowhide, used for lassoing.

Gulch, a gully.

Habilitation, from the Spanish *habilitacion*, a certificate, or stamp on paper, which authorized it to be used for certain purposes. To *habilitate* paper, is to place the mark of habilitation upon it.

To hydraulic, a mining term, to wash dirt by throwing a stream of water upon it through a hose and pipe.

Jaquima, (hack′ ee ma) a head-stall used in breaking wild horses.

To knock down, a miner's phrase, meaning to steal rich pieces of auriferous quartz from the lode.

Manada, (ma nah′ da) a herd of breeding mares under the lead of a stallion.

Mecate, (may cah′ te) a rope of hair, used for tying horses.

Mochilas, (mo chee' las) large leathern flaps for covering a [illegible].

Plaza, a public square in a town.

Playa, a beach.

Pozo, a spring or well.

Pueblo, a town.

To pipe, to wash dirt by the hydraulic process.

Pay-Dirt, auriferous dirt rich enough to pay the miner.

Placer, from the Spanish, a place where gold is found in earthy matter.

To prospect, to hunt for gold diggings: to examine ground or rock for the purpose of finding whether it contains gold, and how much.

Prospect, the discovery made by prospecting.

Rodeo, (ro day' o) a collection of wild or half-wild cattle, made for the purpose of separating or marking them.

Recojida, (ray co hee' da) a similar collection of horses.

Rancho, (ran' tsho) before the Americans took California, meant a tract of land used almost entirely for pasturage, rarely less than four square miles in extent, sometimes as much as ninety-nine square miles, and in most cases not less than thirty square miles. Since the conquest, *rancho*, and its American derivation "ranch," are often applied to small farms, and sometimes, in the way of slang, to single houses, tents, and liquor shops. "Ranch" is sometimes used as a verb: thus a man who opens a farm, according to common parlance, "has gone to ranching." We speak of a "milk ranch," "butter ranch," "cheese ranch," "chicken ranch," etc.

[redacted] and lives upon a rancho. It is usually understoo to mean a Spanish Californian.

Rancheria, (ran tsha ree' a) an Indian hut or a village.

Reata, (ray ah' ta) a rawhide rope, used for lassoing.

Rubric, a flourish, which Mexicans and native Californians append to their signatures, and which, in fact, they consider as an important part of their signatures, and the most difficult to imitate or counterfeit. They often use their "rubrics" alone as signatures. To *rubricate*, to sign with a rubric.

Sluice, a trough used for washing pay-dirt.

Ground-Sluice, a trough cut in the ground for washing pay-dirt.

Tail-Sluice, a sluice put in below a number of other sluices, and depending on them for its supply of dirt and water.

Sluice-Fork, a fork similar to a manure fork, but with blunt prongs, as wide at the point as at the heel. The fork is used for throwing stones out of the sluices.

Sluice-Head, the quantity of water used in a sluice; a constant stream of water running through an aperture, usually two inches high, and from five to fifteen inches long, under a pressure of seven inches.

Slum, slimy mud.

To strip, to throw off worthless dirt from the top of pay dirt.

Sierra, (see er′ ra) originally a saw, a chain of mountains.

Square Meal, a good meal at a table, as distinguished from such meals as men make when they are short of provisions, a condition not uncommon among men who make adventurous trips into the mountains.

Tailings, the waste of a sluice, tom, rocker, or quartz-mill.

Tom, a wooden trough, from ten to fifteen feet long, for washing pay-dirt.

Tom-Stream, or *Tom-Head*, the amount of water used in a tom.

Rocker, or *Cradle*, machine resembling a domestic cradle, for washing pay-dirt.

Wing-Dam, a dam in a creek or river, running partly across.

§ 37. *Spanish Californians.*—The people of Spanish blood in the State are mostly natives of California, Mexico, and Chile. As a class, they are poor and ignorant. The Mexicans and

Spaniards who came to California while Spain held dominion of the country, brought few women with them, but took Indian women for wives; and the descendants of these women form a majority of the Spanish Californians. Among the wealthier families, the Indian cast of countenance has almost disappeared. Although the features are sometimes thick, the expression of the face is mild and pleasant. The complexion is dark, and grows darker with age; the hair is black and straight, the eyes black, the cheeks ruddy. Many of the men are handsome, tall, broad-shouldered, large-boned, strong, healthy, and long-lived. They grow fleshy as they grow old; and the same remark applies to the women. They are a good-natured race, very kind and obliging to their friends, but out of place among Americans, who are too sharp for them in trading. Instead of increasing in wealth with the development of the country, the Spanish Californians have been rapidly growing poorer, and now they own not one-twentieth of the landed property which they had in 1848. Then they owned nearly everything; now there is not a leading merchant or millionaire among them. They regret the conquest. They lived in a very simple manner under the Mexican dominion, but they were secure in their property, and were the political masters. Now they form a small and powerless minority, among a people far superior to them in agricultural and mechanical skill and business knowledge—a people who are absorbing all their wealth, and who look upon them and treat them as inferiors. Although some of the Spanish Californians are content with the change of dominion, yet many hate the Americans. Indeed, the condition of affairs in some of the counties where the Spanish population is numerous, was near civil war at various periods between 1851 and 1854. Most of the Spanish Californians live in the country; their chief wealth is in land and cattle, and the main occupation of the poorer classes is herding cattle.

§ 38. *Chinese.*—The Chinese population of California was

49,310 .in 1870, and of these, 22,760 were in the mining counties, including San Diego, Kern, Yuba, and San Bernardino, in which mining occupies only a small part of the inhabitants. San Francisco has 12,030; Sacramento, 3,596; Nevada, 2,627; Placer, 2,410; Yuba, 2,337; Butte, 2,082; and other counties smaller numbers. The census reports so far published, do not classify the Chinese according to their occupations; but by my estimate, 18,000 of them are miners, 8,000 are agriculturists, and 22,000 are manufacturers, fishermen, domestic servants, merchants, washmen, etc. In the class of miners are included the builders and menders of roads.

Most of our Chinese came from Southern China, and belong to large companies, each of which represents the district from which its members came, and has a large building in San Francisco, where they lodge and feed all the members of their company when they arrive from China, or when they come on a visit from the interior. The companies are benevolent associations, and take care of their indigent and sick. There are few Chinese beggars in the streets, and few Chinese patients in the public hospitals. The common laborers are brought to the State under contract to work for several years at a low rate of wages (from four to eight dollars) per month; and they usually keep these contracts faithfully. The employers in these cases are either the companies, or associations of Chinese capitalists. The merchants are considered to be very faithful to their promises, and in San Francisco they can get credit among their acquaintances quite as readily as other men in similar-branches of business. In the mines, the Chinamen work in the poorest class of diggings. They own no ditches, large flumes, hydraulic claims, or tunnel claims. The white miners have a violent antipathy to them, will not permit them to work in many districts, and will often drive them from their best claims in the districts where they are permitted to work. Sometimes the Celestials venture to dam a stream, but not often. They use the rocker more than any other class of miners.

In San Francisco, the merchants are usually in partnerships, with not less than three nor more than ten partners, all of whom live in the store, and deal chiefly in Chinese silks, teas, rice, and dried fish. The two latter articles form a large portion of the food of the Chinamen in the State. They have not learned to use bread instead of rice. Those who can afford it eat pork, chickens, and ducks. Beef, and most of our garden vegetables, do not find much favor with them, even among the wealthiest. The washermen are usually in companies of two or three, and they have numerous little shops in the streets of San Francisco, and in the smaller towns. They sprinkle their clothes, previous to ironing, by filling the mouth with water and then blowing it over them. For ironing, instead of a flat-iron, they use an iron pan with a smooth bottom, and kept full of burning charcoal.

The Chinese men, women, and children learn English very slowly; most of those who have been five or six years in the State cannot understand the most common English words. All the Chinamen in California adhere to their national costume, with some slight variations. They wear their hair long, use no white muslin or linen next the skin, and very few ever put on a dress coat or stove-pipe hat. In the cities, they ordinarily use wooden-soled shoes, with thin cotton uppers. Instead of a coat they have a short blouse, generally of dark-blue cotton, fitting close up to the neck. The wealthy have this blouse made of silk or fur. In cold weather, if of silk or cotton, it is wadded. The legs and lower part of the body are enclosed in breeches of cotton or silk, tight from the thigh down, [illegible] loose above. Trowsers, boots, and felt hats are common.

The law tolerates the Chinese. A treaty gives them the right of coming to our country, living here, and engaging in business; but they are excluded from the privileges of naturalization.

The statutes of California levying a tax of $50 each on all

Chinese immigrants, and a tax of $4 per month on all Chinese miners, have been declared void by the Courts; and the statute forbidding them to testify against a white man was repealed by the new Code, in a clause of which the people knew nothing till after its adoption. Public sentiment and partizan policy in California are decidedly hostile to the Chinamen, have shown them no mercy, and have not insisted on the punishment of the numerous crimes committed against them. The Chinamen have no votes, elect no officers, support no newspapers, and have few advocates.

Riots, to beat and murder Chinamen, to destroy their houses, and to drive them away from places where they wer employed, have been frequent in the State. Many public meetings have been held to fan the hatred against them int flames. A prominent politician, in a public speech, expressed a wish that the Pacific Mail steamers which bring immigrants from Canton, should be burned. A Jesuit priest, in 1873, delivered an anti-Chinese address in a Catholic Church in San Francisco, and in its course thus addressed his auditory:

"If, I say, they [the Chinese] should ever become domiciled in our country, your posterity will be doomed to a miserable fate—a fate against which it will be useless for them to struggle, for it will not have the power to resist; and bitter, aye bitter, will be the curses on your memory, when you are gone, for the legacy which you have left to it."

The address was published in full in the *Monitor*, the leading organ of the Catholic Church in California, and was commended editorially as an "admirable discourse."

Chinamen are exposed everywhere to insult and injury, as a hated and helpless race must be everywhere, if there are ruffians among their enemies. They are, besides, exposed to mob violence in case they should enter into new employments. They would not dare to work in the gold quartz mines at Grass Valley or Sutter Creek; nor would it be safe for them to undertake to do work of stevedores or hod-men in San Francisco. Assault and murder would be the probable punishment of such grievous offenses. Arson has been used often against them and their employers. Factories, quartz mills, wheat stacks, and dwellings, have been burned on many occasions; half a dozen white men have been assassinated, because they hired Celestials. The owners of several factories have dismissed Chinese operatives in times of anti-Chinese excitement, to save their property from the torch.

Hundreds of farmers, miners, and manufacturers would like to hire Celestials, but dare not offend the anti-Chinese ruffians. The Chinese have been employed extensively on the railroads, but would not have been if their work had been combustible, or if the directors of the companies had lived near the line of their roads in solitary houses, where assassination would probably have escaped detection. The opportunity for the crime, but not the will, was lacking. Chinamen do not erect costly houses in solitary places, nor in small towns; but they have purchased some good buildings in San Francisco, where they are protected against fire by the abundance of people and by the fears of the conflagrations extending to the property of white men. Even in the metropolis, with its crowded streets and numerous policemen, the Celestial washmen usually have their windows boarded up to keep out murderous cobblestones. While the great majority of the white people treat the yellow men kindly, still there are enough ruffians to make their condition unenviable. They live among us by sufferance, and all want to leave so soon as they can save enough to enjoy comfort elsewhere.

It is said that the Chinamen should not be tolerated here because they are an inferior caste, they do not learn our language or customs, they send away the money of the country, they make no improvements, they pay few taxes, and they are immoral Pagans, and enslaved. The only slavery among them in California, is an honest compliance with their contracts, entered into freely. They pay their debts incurred for their passage money, and that is a kind of slavery that might prevail more extensively among other nationalities without hurting them.

The Paganism is brought up only as an excuse for persecution. If industry, economy, sobriety, fidelity in service to the extent of their knowledge, humanity, peaceful disposition, good order, kindness of manner, prompt payment of debts, and attention to their own business, be immoral, then the Chinamen are. There can be no caste in California except in so far as their exposure of crime, and their submission to illegal violence, makes them an unfortunate class. They are free, and their children born here are citizens and voters; and, under such circumstances, caste is not possible.

Should they be blamed for not erecting houses for their enemies to burn, or can we find fault if they send away money which they can neither invest nor enjoy here in security? Could we expect them to adopt our customs or language, when we show to them that they must not think of this as their home? If California wants them to study her interests, she should study theirs. The highest triumph of statesmanship consists in bidding successfully for men, and the grossest of all political blunders have been committed by driving away industrious, skillful, peaceful, and honest workers. France and Spain, by such mistakes, enriched Holland and England; and perhaps California can enrich Oregon or British Columbia in a like manner. The Chinese are a very desirable class of inhabitants. They have all the natural qualities needed to make a rich and happy State; and if they understood that they could enjoy their wealth here, they would probably soon change their policy, and fit themselves for the country, by making greater efforts to learn its language and customs, by adopting the whites' costume, building good houses, and bringing their women with them.

Complaint is made that the Chinamen deprive the poor white men of employment and drive them from the State;

but there is reason to believe that the Chinamen support indirectly a large proportion of the white men in California, and that the larger the number of Chinamen the more white men will be needed and the greater their profit will be. We owe to them nearly all our railroads, all the large irrigation ditches lately built or now in progress, nearly all our reclamation dykes, most of our factories, and many of our wagon roads. Without their help we could not manage our vineyards, our orchards, or our grain harvests. If we could not afford to do without the Chinamen now here, we should not lose anything by having more of them. There is room here for 3,000,000, and we would have had that number if those here had been received properly, and they would indirectly or directly support at least as many white people. But when we are to obtain 2,000,000 whites under our present policy is extremely doubtful. With a population of 4,000,000, (and Italy with a smaller area has 24,000,000) our farms, our quartz mines, our town lots, our railroads, and all our property, would be vastly increased in value, and thousands of white men who are now barely able to support themselves and maintain their possessions, would then be wealthy.

Any considerable addition made to the number of industrious, skillful, and economical workmen must add to the value of land. The interest of the land-owner in a country where most of the area is the property of the Government, and is offered by it as a gift to poor citizens, must be the interest of the State; and if it were in conflict with the interest of homeless and landless laborers, then the latter should be sacrificed. The Chinese dig at least $6,000,000 annually, or nearly one-third the gold yield of the State. We could not do without that. They are indispensable in our kitchens. If the Chinamen were expelled, a thousand white families would break up house-keeping, and never resume it again. Thousands of farm-houses, country hotels, and boarding-houses in the small towns, would be in confusion, if the Chinamen should all leave. But the chief sufferer would be San Francisco, which would find many factories closed, five hundred houses vacant, and several thousand white men deprived of their incomes.

The idea that industrious, economical, and skillful laborers can impoverish a country, is absurd. They must enrich it. The lower the wages for which they work, the greater the profit made by the remainder of the community. The more of the cheap laborers, the better for the others. The white men have vast advantages in the possession of all the capital, the language, the mechanical skill, the government, and the exclusive right of claiming mines and preëmpting farms on the Federal domain. Under these circumstances, if they cannot compete with the Chinamen, then for the welfare of California, they should give way before the stronger race. But there is no danger that the white men would be driven out of California. On the contrary, the more Chinamen, the more white men.

Fears have been entertained that the poor whites would be swamped by the immigration of Celestials, not only to California, but also to the Atlantic States and Europe; but there is no ground for apprehension. The estimate of 350,000,000 inhabitants for China is too high by 100,000,000, according to the latest authorities; and if the Chinese emigrants were kindly received and properly taught the useful arts in Christian lands, factories in the valleys of the Yangtze and Hoangho would soon furnish employment for their surplus labor. It is the interest of California that the Chinese should emigrate, partly to stimulate business in China, partly to increase production on all the coasts of the Pacific, and partly to provide numerous skilled laborers, who will go back to their native country and help to build up their manufactories of iron, cotton, silk, wool, etc., with the help of steam. China has the coal, the iron, the labor, and the capital, and when the skill shall be provided, the work will soon be done. Our prosperity is intimately associated with that of our Asiatic neighbors.

§ 39. *Indians.*—The Indians are a miserable race, destined to speedy extinction. Twenty-five years ago they numbered fifty thousand or more; now there may be seven thousand of them. They were driven from their hunting-grounds and fishing places by the whites, and they stole cattle for food; and to punish and prevent their stealing, the whites made war on them and slew them. Such has been the origin of most of the Indian wars which have raged in various parts of the State at intervals since 1849. The poor Indian, afoot, and armed only with the bow and arrow, is no match for the rich American, armed with rifle and revolver, and mounted on a horse, which saves him from fatigue, takes him swiftly to the best point of attack, or carries him still more swiftly from danger. For every white man that has been killed, fifty Indians have fallen.

In 1848, nearly every little valley had its tribe, and there were dozens of tribes in the Sacramento basin; but now most of these tribes have been entirely destroyed. Disease and brandy have coöperated with the bullet and the knife, to make room for the white men. The Indians are fond of strong liquor, and when they can get it, frequently become habitual drunkards. The squaws drink as much as the "bucks." Among a tribe of drunken men and women, matrimonial constancy is not to be expected; nor is it found among the Indian women in California. The infectious disease which threatens to utterly destroy all barbarous and semi-barbarous nations, has slain many of the red men in this State, as well as in other parts of the continent.

The Indians of California, with the exception of the Mojaves, are supposed to belong to the general division of the Shoshonees, which includes also the Indians of Nevada, and a majority of those in Utah. They are physically and intellectually inferior to their relatives in Nevada, and far inferior to the Indians who dwelt during the last century east of the Mississippi River. The red men of this State have but a small share of the courage, military spirit, and intellectual activity of the Shawnees, Miamis, Delawares, and the other tribes who contended so stoutly for the possession of the valley of the Ohio. The majority of the Californian Indians never learned to use fire-arms, and never dared to meet the white men in battle. A few in the northern part of the State have rifles, use them well, and fight stubbornly, but they are a small proportion.

The Californian Indian men are about five feet and a half high on an average, and the women four feet and ten inches. They are very thick in the chest, and have voices of wonderful strength. The children are clumsy, and heavy set. The women are very wide in the shoulders and hips, and strongly built. Men and women are large in the body, and slim in the legs and arms, as compared with Caucasians. When not affected by hereditary diseases, caught from the white men, the Californian Indians have healthy constitutions, and formerly they lived to a great age. During the last ten years, a number have died, with the reputation of being more than one hundred and twenty years old. It is a common assertion that the wild Indians never take cold. During the winter of 1849–'50, I lived near a tribe in the mines, in what is now Shasta County, and I saw that the men never wore any clothing save a deerskin thrown over the shoulders; that men, women, and children went barefooted through a winter when snow lay on the ground for a week at a time, and that their huts were only about six feet wide, were open on all sides, and on two sides had holes large enough for men to get in and out; and I never saw one troubled with a cold or cough. In the tribes living far from the whites, the men usually go naked, and the women wear a petticoat made by fastening flags or strips of bark, about eighteen inches long, to a girdle. They are filthy in their habits, and their houses are always filled with vermin. Their form of government is simple. They have hereditary chiefs who have little power. The tribes are small, and have no wealth and no laws. Occasionally a member of a tribe gives offense, and some of the leaders agree to kill him, and the sentence is carried into effect by waylaying him and shooting him with arrows. Their rule is blood for blood. They rarely keep men prisoners, but kill adult male captives immediately. Women and children are held frequently as prisoners; and one of the most common causes of war is the capture of women. They have no hereditary slavery. They have no marriage ceremony, and the duration of the marriage relation depends entirely upon the pleasure of the husband. Polygamy is permitted by many of the tribes. The women are not prolific, or at least the children are few, and mostly boys. The girls are neglected, or intentionally killed soon after birth, and this policy would, if continued, soon cause an extinction of the race in California. In certain tribes on the northern coast, if a mother, having an infant child, dies, the child is buried with her. Most of the tribes burn their dead, commencing the cremation in the evening, and keeping up the fire all night, while the friends watch, and the women relatives utter plaintive cries until daylight. They have no religious ceremonies; or no ceremonies to which they attach ideas clearly religious. Every year, usually in the spring, they have a dance, as it is called. They assemble, build a large fire, and the men surround it, and keeping their knees, elbows, and backs bent, they beat time with their feet to a monotonous song, which they sing with the assistance of the squaws, who sit off on one side. In some tribes, several of the men have pipes, from which they elicit a few notes as an accompaniment for the song.

The squaws are treated like slaves. They are required to do all the work, and to attend to every want of their husbands. They must collect vegetable food, prepare it, and carry all the movable property in times of migration. They are beaten on the slightest provocation. The men never consult them about the management of public or private affairs.

They are bought as merchandise from the parent, and treated as slaves after the purchase.

Most of the wild Indians have no permanent place of residence. Each tribe has a territory which it considers its own, and within which its members move about. Each family has a hut, and a cluster of these huts is called a *rancheria.* The rancherias are usually established on the banks of streams, in the vicinity of oak-trees, horse-chestnut bushes, and patches of wild clover. Such places are generally on fertile soil, with picturesque scenery. In the Sacramento Valley the most common plan for a hut was to dig a hole three or four feet deep and ten feet across; erect an upright post in the center, about six feet high; lay poles from the edge of the hole to rest on this post, and cover the poles with grass and then with dirt. In some districts the hut is made by taking large pieces of pine bark and laying them against a frame-work of poles fastened together in a conical shape. In the San Joaquin Valley it was more convenient to make a frame-work of poles, and cover it with rushes or tules. These huts may be deserted for a time, but are considered the property of the builders, who move, according to the seasons, to those places where they can obtain food most conveniently. In one month they go to the thickets; in another, to the open plain; in another, to the streams.

Their food is composed chiefly of acorns, clover, grass, grass seeds, grasshoppers, horse-chestnuts, fish, game, pine-nuts, edible roots and berries. The acorns of California are large, abundant, and some of them are not unpleasant to the taste, but they do not contain much nutriment as compared with an equal bulk of those articles commonly used for food by the Caucasian race. The acorns are gathered by the squaws, and are preserved in various methods. The most common plan is to build a basket with twigs and rushes in an oak tree, and keep the acorns there. The acorns are prepared for eating by grinding them and boiling them with water into a thick paste, or by baking them in bread. The oven is a hole in the ground about eighteen inches cubic. Red-hot stones are placed at the bottom of the hole, a little dry sand or loam is thrown over them, and next comes a layer of dry leaves. The dough or paste is poured into the hole until it is two inches or three inches deep. Then comes another layer of leaves, more sand, red-hot stones, and finally dirt. At the end of five or six hours the oven has cooled down, and the bread is taken out, an irregular mass, nearly black in color, not at all handsome to the eye or agreeable to the palate, and mixed with leaves and dirt. For grinding the acorns, a stone mortar is used. This mortar is sometimes nearly flat, with a hollow not more than two inches deep; and occasionally one will be seen fifteen inches deep, and not more than three inches thick in any part of it. The pestle is of stone, round, ten inches long and three thick.

Horse-chestnuts are usually made into a gruel or soup. After being ground in the mortar, they are mixed with water in a waterproof basket, into which red-hot stones are thrown, and thus the soup is cooked. As the stones when taken from the fire have dirt and ashes adhering to them, the soup is not clean, and it often sets the teeth on edge.

Grass-seeds are ground in the mortar, and roasted or made into soup.

Grasshoppers are roasted, and eaten without further preparation, or mashed up with berries.

Fish and meat are broiled on the coals. The intestines and blood are eaten, as well as the muscle.

Clover and grass are eaten raw. The Indians go out into the clover patches, pull up the clover with their hands, and eat stalks, leaves, and flowers. They consider clover a great blessing, and get fat on it.

The Indians rarely have salt and spices, and most of their food is such as a white man could not eat, unless reduced to near starvation. In eating they have no plates, cups, knives, or forks, nor do they use any utensils in preparing their food, save the mortar and waterproof basket. The pine-nuts, edible roots, and berries, are eaten raw. Bugs, lizards, and snakes are all considered good for food. In those places where the tules grow, the roots of those rushes are eaten. Except one or two tribes in the Colorado Desert, the wild Indians of California never tilled the soil.

They use very few tools. The bow was the only weapon for killing quadrupeds. It is made of a reddish wood, said to be the western yew, and on the back the bow is strengthened with a covering of deer's sinews. The arrows are of reed, and have a head made of obsidian, a transparent, vitreous substance of volcanic origin, in appearance very similar to a coarse quality of glass. The arrow-heads are made two inches long, half an inch wide, and an eighth of an inch thick, with a very sharp point and sharp edges. The head is fastened in a split of the shaft of the arrow by tying with deer's sinews. Such an arrow-head can be used but once, for the obsidian is as brittle as glass and breaks at the first shock. Some tribes, in the northern part of the State, poison their arrows by irritating a rattlesnake and then thrusting forward a fresh deer's liver, which it will bite. After it has bitten repeatedly, and thrown some of its poison at every bite into the liver, the latter is buried and allowed to putrefy. It is then dug up, the arrow-head is dipped in it, and allowed to dry. An arrow thus poisoned will kill a man, a horse, or an ox in twenty-four hours, or less time; and it is said that the meat of an animal thus killed may be eaten with safety. I know that the Indians eat the meat of animals killed with poisoned arrows, but I am not positive that the poison was prepared in this manner. The poison of a rattlesnake is not injurious when taken into a sound stomach: it is only when injected into the blood that its injurious influences are felt. The arrows, even when not poisoned, make very dangerous wounds, for the sinew used to fasten the head soon softens, and allows the head to remain when the shaft is pulled out.

The Indians are very familiar with the habits of wild animals. They know precisely the character of the brushwood and ravines in which the deer and bear hide during the day, and the places to which they go to feed in the morning and evening. In hunting deer and antelope, in places where there is grass eighteen inches or two feet high, the Indian will often hold the skull and horns of a buck deer before him, and thus crawl within bow shot. The Pit River Indians dig pits about five feet cubic, and cover them with brush and grass, and thus catch deer, hares, and so forth. For catching wild geese, various small and simple kinds of nets are used, and they are knocked down with clubs. Salmon are killed with stones and clubs in shallow water, and are caught with spears. Their most ingenious spear has a head of bone about one inch and a half long, and sharp at both ends. To the middle is fastened a string, which is attached to the spear-shaft. One end of the head fits in a socket at the end of the spear-shaft. When the spear is thrown, the head comes out of the socket and turns cross-ways in the fish, and then there is no danger that it will tear out. The Indians rarely hunt the grizzly bear. Along the ocean beach they get barnacles. Their method of catching grasshoppers is to dig a hole several feet deep, in a valley where this species of game abounds. A large number of the Indians then arm themselves with bushes, and commence at a distance to drive the grasshoppers from all sides toward the hole, into which the insects finally fall, and from which they cannot escape. The pine-nuts are sought at the tops of the pine-trees, which the "bucks" ascend by holding to the rough bark with their hands, and pressing out with their legs, so that they do not touch the body to the trunk of the tree in going up. It is more like walking than climbing.

The bow and arrow, the spear, the net, the obsidian knife, the mortar, and the basket, are the only tools made by the Indian. The obsidian knife is merely a piece of obsidian, as large as a hand, and sharp on one side. The baskets are all made of wire-grass, a grass with a round jointless stem, about a sixteenth of an inch thick and a foot long. The basket-work made with this wire-grass resembles the texture of a coarse Panama hat, and is waterproof. All the basket-work of the Californian Indians is made of this material. The most common shape for the basket is a perpendicular half of a cone, three feet long and eighteen inches wide, open at the top. The basket, carried on the backs of the squaws, is used for carrying food, miscellaneous articles, and children. Neither the Californian Indians of the present, nor of any preceding century, made such mounds, circumvallations, arrow-heads, or spear-heads of flint, or pipes and battle-axes of stone, as are found in the State of Ohio. There is nothing to indicate that any of the inhabitants of the country, previous to the arrival of the Spaniards, were above a very low degree of savagism. They have no domestic animals save the dog, and that of a small kind. They have so little skill in the preservation of food, that, like wild beasts, they grow grossly fat in the spring and poor in the winter. The Mojave Indians, in the Colorado Desert, depend for their subsistence chiefly on cultivated food. They plant wheat, grass, pumpkins, and muskmelons. After the annual overflow of the bottom land, a small patch of ground is cleared off with the help of knives and fire; then small holes are made, the seeds are deposited, and the field is left to grow up as well as it may. The muskmelons are eaten fresh; the pumpkins are eaten fresh, or sliced and dried; the wheat and grass-seeds are ground, made into a paste with water, and dried in cakes. The mezquit bean, next to the cultivated grains, pumpkins, and squashes, is the most important article of food with the Indians of the Colorado Desert. These beans are prepared for eating in the same manner with the wheat and grass-seed.

The preceding remarks relate to the wild Indians only, and are intended to illustrate the natural habits, character, and capacity of the race. During the last fifteen years, however, they have all been influenced so much by intercourse with the whites, that they have lost many of their wild habits and acquired new ones. In some districts they have fire-arms; in others they obtain much of their food and clothing from their Caucasian neighbors. In the counties along the southern coast, there are many civilized Indians, who live in adobe houses, and support themselves by herding cattle, breaking horses, and working in the grain fields, orchards, and vineyards. They have lost much of the savage expression of countenance, and some of them have become very industrious and trustworthy laborers; but the majority are idle and dissipated in their habits. They have all learned a vulgar dialect of the Spanish, and a few speak a little English. The younger ones know nothing of any tongue save English and Spanish, but the elder Indians, when talking with one another, prefer to use the language of their fathers.

§ 40. *Mining Towns.*—The towns of California are seaport, inlandport, railroad, agricultural, and mining. The mining towns enjoyed their greatest prosperity from 1852 to 1860. Weaverville, Shasta, Oroville, Quincy, Nevada, Auburn, Downieville, San Andreas, Jackson, Sonoma, and Mariposa, are the county-seats of various mining counties. Most of them are built with crooked streets through the middle of a cañon, which near the middle is densely lined with stores, billiard rooms, liquor shops, and restaurants. The dwellings are scattered about irregularly: some are neatly built and are surrounded with pleasant gardens; the majority are miserable little shanties or log-cabins, with no yard, flowers, or fruit-trees to give an appearance of home. The population is not permanent. One year the people are here, next they are elsewhere. In 1854 Oroville was laid out; in 1857 it cast one thousand votes, in 1860 its glory had departed, and at least a dozen towns have now a larger population and a larger trade. Copperopolis has now a population of about 200; in 1864 it cast 564 votes. Columbia in 1860 cast 1,008, and in 1873, 341 votes. Mokelumne Hill was for a long time one of the leading towns of the State; now it has very little importance. Nevada and Grass Valley have suffered less decline than any other gold-mining towns which were prominent fifteen years ago; the former had 3,986 and the latter 7,063 inhabitants in 1870. The mines in their vicinity are not yet exhausted. From 1860 to 1864, when the main traffic across the Sierra Nevada passed through Placerville, that was one of the busiest towns in the State.

§ 41. *Inland Ports.*—Sacramento, at the head of navigation for large river steamers, and Red Bluff for small steamers on the Sacramento, and Marysville for small steamers on the Feather River, are the only places that could properly be called river ports. The slough ports are San Rafael, Petaluma, Napa, Suisun, Stockton, Pacheco, Oakland, Union City, Alviso, and Redwood. All these inland ports, save Union City, Alviso, and Pacheco, have been supplied with railroads, but Red Bluff, Suisun, Stockton and Petaluma have been seriously injured by the railroad influence. Slough traffic is still maintained, but it has lost much of its importance.

§ 42. *Railroad Towns.*—Before the San Joaquin Valley Railroad had been built, the towns of Empire and Paradise were established on the Stanislaus River, and Tuolumne City on the Tuolumne River; but the iron track passed to the west of them, and they were moved to the road. It is the misfortune of Visalia and Shasta that they are not on the main road passing through the middle of the Sacramento-San Joaquin basin, and Yreka is in danger of being left at one side, by the California and Oregon Railroad. The towns which have derived the most benefit from the railroads, are Oakland, Vallejo, Sacramento, Napa, Calistoga, Santa Rosa, Healdsburg, Cloverdale, San José, Gilroy, and Salinas; and with the exception of San José, all were founded by Americans. The railroad system of the State will probably, at no distant time, reach the southern coast, and give activity and population to many of the old Spanish settlements.

§ 43. *San Francisco.*—San Francisco, styled figuratively the Golden City, the metropolis of the finance, commerce, manufactures, and fashion of the Pacific Coast of North America, is situated in latitude 37° 48′, about the same distance from the equator as Richmond, Lisbon, Palermo, Athens, Smyrna, and Yeddo, and four miles from the Pacific Ocean on the western shore of San Francisco Bay. The climate is cool throughout the year, never cold enough to freeze, and seldom hot enough to make light clothing comfortable. The average temperature of January, the coldest month, is 49°, and of September, the warmest month, 58° Fahrenheit, the difference being only nine degrees; whereas the difference between January and July is 42° in New York, 25° in London, and 30° in Naples. No other city in the temperate zone has a climate so equable as that of San Francisco; none in any zone has a temperature better suited for the growth of physical health and development, or for the intellectual and physical activity of man. The climate is so cool in summer that sunny exposures are preferred for residences, and shade trees are very few. In our parks and ornamental grounds we prefer low, bushy evergreens, not tall, wide-spreading, deciduous trees. The peninsula of San Francisco has a poor soil, and is bare of trees. During the late winter and spring the surrounding hills are covered with green grass, but in the summer, fall, and early winter, the adjacent country and the city itself have a cheerless, dirty, yellow look.

The people are mostly Americans by birth, but there are also many English, Irish, French, Germans, Italians, Spanish-Americans, Scandinavians, Dalmatians, and Chinese. There are French, German, Italian, and Spanish newspapers; French, German, and Chinese churches, and French, German, and Chinese theatrical companies, which perform occasionally. The religions in which public services are regularly held are: Jewish, Buddhist, Catholic, Protestant, and Spiritualist. The city has twenty-eight Protestant and ten Catholic churches, two

Jewish synagogues, and six buildings in which Buddhist ceremonies are occasionally held. The most splendid edifice devoted to purposes of worship in the city is the Synagogue Emanu-El. An Episcopal Bishop and a Catholic Archbishop reside here. Among the Protestant churches are five Presbyterian, four Congregationalist, three Baptist, eight Methodist, four Episcopal, three Lutheran, and one Unitarian. If, however, church-going be necessary to religion, then it might be said that the majority of the people have no religion. On pleasant Sundays the cars and ferries are crowded with persons going out into the suburbs or the country, to visit places of amusement, or to stroll about and enjoy the fresh air. Religious prejudices are not strong. Protestant, Catholic, and Jew associate together in business and society with the utmost friendliness, as if it were better to agree about the affairs of this world than to quarrel about those of another. When any important financial, social, or political movement is on foot, the managers are not satisfied unless all classes are brought in and represented. The daily press treat all forms of faith with equal respect, and frown upon all attempts to excite religious animosities. No church monopolizes the business, the wealth, the intelligence, or the political government of the city. The Catholics have the most compact religious organization, the Jews have a large portion of the importing and treasure trade, and the Protestants or persons of Protestant descent hold most of the offices. Under such circumstances, religious bigotry cannot thrive.

There are a vast number of benevolent and social associations in the city. There are two Jewish, one German, one French, one Spanish, one Scandinavian, one Italian, one Swiss, one Dalmatian, and one City Benevolent Societies, fifteen Masonic Lodges, nine Odd Fellow Lodges, and at least one each of the B'nai B'rith, Druids, American Protestant Association, American Mechanics, Seven Wise Men, Knights of Pythias, Independent Red Men, Improved Red Men, and Ancient Order of Knights. The Catholic Church maintains two Orphan Asylums, a hospital, and a Magdalen Asylum. The Protestants have an Orphan Asylum, and an association for the relief of destitute women. The German and French Benevolent Societies have each a fine hospital.

San Francisco is, in proportion to its size, the busiest seaport of the world. No other city twice as large has so large a trade. The annual exports are about $70,000,000, the imports nearly as much, the manufactures are worth nearly $20,000,000, the real estate sales amount to about $12,000,000, and the cash value of the land, buildings, and movable property of the city, is about $300,000,000. We send away about forty tons of silver and six tons of gold every month—the former metal in bars fifteen inches long and five inches square; the latter in small bars about six inches long, three inches wide, and two inches thick. Wagons loaded with the precious metals are seen in the streets nearly every day. The profits of merchants and the wages of mechanics and laborers are high.

In the matter of public amusements, the city is destined to become eminent. The mild winters and cool summers are favorable to out-door life. The people spend much of their time in the open air. Processions, picnics, excursions, and public displays are frequent. Dancing is in fashion throughout the year. Two theaters are open almost constantly, and we have an opera season every year, besides numerous concerts and lectures. Those who wish to go out in a buggy, usually drive to the splendid ocean beach, on a romantic road, over the hills west of the city. The spring and early summer, when the country is green, is the season for leaving the city. The number, however, of those who come to San Francisco for pleasure, is much greater than of those who leave it. Everybody who lives on the Pacific slope wants to make a home in this city, or at least to spend some time here. The miner who has made a successful strike, the farmer who has a good crop, the lawyer who has accumulated a nice property by practice in the interior, looks forward to the day when he can enjoy the fruits of his labor in the metropolis of the Pacific. There is a multitude, a variety, and a rapid succession of entertainments, unequaled by any city of the New World, save New York. The most costly productions, and the greatest delicacies of all quarters of the globe, are here collected. Kearny Street, though shorter than Broadway, is not less brilliant. Our hotels are palatial in size, furniture, cost, and style of management. When we see a city not yet out of her teens rivaling in luxuries the capitals of Europe, what grandeur may we not expect for her maturer years?

San Francisco has the misfortune of standing upon the bare, treeless, and sandy point of a peninsula, where constant winds render it a matter of difficulty to train up any shrubbery except under the immediate shelter of a house or fence. The city has few large private gardens, and its only large park is still new and its trees young and small. The western portion of the municipal territory is a waste of sand, and much of the southern is a waste of high hills; and yet for pleasant drives, and romantic scenery in the vicinity, San Francisco has no superior. The view from the Long Bridge on a quiet evening is very pleasant, and without a parallel in the United States. A beach with an uninterrupted surf like ours would make the fortune of an Atlantic watering place. The sea lions are an attraction, without their like elsewhere. Saucelito, north of the Golden Gate, and only four miles distant, is a very romantic place.

San Francisco has a number of views unsurpassed for extent in the vicinity of large cities. Rome had seven hills: the metropolis of California has we know not how many. It may be said that she is divided into three amphitheaters, each enclosed by hills on three sides: the amphitheater of Yerba Buena, east of Russian Hill; the amphitheater of Spring Valley, west of Russian Hill; and the amphitheatre of the Mission, south of Pine Street Hill. From the hill-tops we see the city, and a large area of surrounding country. Telegraph Hill is 300 feet high, Russian Hill 360, and Lone Mountain 400 feet.

Looking out Market Street we see, two miles from Montgomery Street, two peaks which rise to a thousand feet, and command a view of 40 miles distant north, south, and east, and 20 miles west. Eight miles south of the city is Mount San Bruno, 1,500 feet high; 20 miles north is Tamalpais, 2,600 feet high; and 35 miles eastward is Mount Diablo, 3,856 feet high.

The population of San Francisco was 149,473 in 1870, according to the Federal Census.

H. G. Langley, who has taken much care to compile an annual directory for the last fifteen years, and has devoted special attention to the number of inhabitants, asserts that it was 188,000 on the 1st of March, 1873. He says:

> The following estimate of the population of this city has been prepared from careful investigation made during the progress of the canvass for the present volume, and other reliable data; and in directing attention thereto, the compiler believes that the aggregate presented is a fair approximation to the actual number:

White Males over twenty-one	60,197	
" Females over eighteen (estimated)	37,100	
" Males under twenty-one (estimated)	38,641	
" Females under eighteen (estimated)	33,435	
" Males, names refused, and foreigners not taken in the canvass (estimated)	1,800	
Chinese, Male and Female	11,000	
Colored, Male and Female	1,550	
Total permanent population		183,723
To which should be added a large element of our population known as "floating," which consists of: 1st. Transient boarders, etc., at hotels, boarding-houses, etc. 2d. Soldiers at the fortifications in the harbor. 3d. Persons engaged in navigating the bay, who claim the city as their residence. 4th. Inmates of Alms House, hospitals, and other charitable institutions, County Jail, etc. 5th. A large number of persons who have no permanent place of abode: together amounting to about		4,600
Total population, March 1, 1873		188,323

According to Langley, the number of buildings in March, 1872, was 20,287, including 4,720 of brick, and 15,807 of wood, and in the year following, six hundred additional buildings were erected.

The first house was built in 1835, and the place was then called Yerba Buena, Spanish for "good herb," applied to a species of mint growing in the vicinity. In 1847 the name was changed to San Francisco. In 1846 the population was six hundred, and had grown to about one thousand in the spring of 1848, when the gold fever broke out. During July, August, and September, the town was deserted by many of its residents; but as the people became impressed with the richness and extent of the mines, and as adventurers began to arrive from abroad, the population of the town increased, and then suddenly it sprang from an obscure village to a world-famous city. In May and June, 1850, and in the same months the next year, great conflagrations swept away the wooden shanties with which the main part of the city was built up; and it was not until the latter half of 1851, that the citizens commenced to erect the numerous fine brick stores which now ornament the principal business streets. The sand ridges on the site of the city were cut down, and the hollows were filled in; and the shallow cove in front of the mainland was also filled in, and made the foundation for the busiest part of the town.

The hotels of San Francisco are famous for their excellence, and also for their cheapness, as compared with houses of equal comfort in New York, Chicago, Paris, and London. The Occidental and Cosmopolitan has each accommodations for 400 guests, the Lick House for 350, and the Grand for 300. The price at each (and they are the most costly houses in San Francisco) is $3 per day, for board and lodging. The tables in all are supplied with an abundance and variety of the best provisions, cooked in the best style. The Lick House dining hall is the most elegant room of its kind in the United States, and is superior, if report be true, to the dining hall of the Grand Hotel at Paris. The restaurants of San Francisco are unequaled in the United States.

§ 44. *Sacramento.*—Sacramento City, the political capital and second town of California, is situated near the center of the Sacramento basin and of the State—is one hundred and twenty-five miles by the course of navigation, and seventy-five miles in a direct line, distant from the ocean, on the southeastern corner of land formed by the junction of the Sacramento and American Rivers, at an elevation of fifty feet above the sea, in latitude 38° 33′ and longitude 121° 20′. The business part of the city is about twenty feet above low-water mark in the Sacramento River, which, in front of the town, during the dry season, rises and falls about a foot with the tide. The site is level, and in the midst of a wide plain, most of which is bare of trees. The streets are wide and straight, run with the cardinal points of the compass, and are designated only by numbers and letters. Those parallel with the Sacramento are first, second, third, and so forth; those parallel with the American are A, B, C, and so on. The main business part of the city is near the Sacramento, extending from First to Sixth, and from H to L streets. The houses and stores there are mostly built of brick, one or two stories high. The streets are gravelled or planked; the side-walks are planked or paved with brick, and covered with awnings to give protection against the sun. In those parts of the town used for dwellings, the houses are chiefly of wood, neatly painted, and surrounded by gardens; and the streets are lined with shade-trees, such as cottonwood, willow, sycamore, elm, and locust. There are waterworks and gas-works. The water is pumped up from the Sacramento River, which is so tu[illegible], even at its clearest stage, that six inches of mud are deposited monthly in the reservoir.

The first settlement by white men on the site of Sacramento was made in 1839, by John A. Sutter, a Swiss by birth, who, after having served as a captain in the body-guard of Charles X of France, came to the United States, where he was Americanized. He afterwards came to California, and was admitted to Mexican citizenship. He obtained a grant of eleven square leagues of land on the eastern bank of the Sacramento River, and under that grant the title to the site of Sacramento City is now held. In 1841 he built some adobe buildings, which he dignified with the title of New Helvetia, while to the Americans it was generally known as "Sutter's Fort." It was, for a long time, the only place where white men had a permanent foothold in the Sacramento basin; and it was a place of importance, as the first point where the American trappers, travelers, and immigrants, entering the territory from the eastward, could obtain provisions, ammunition, and horses, and rest secure against Indians. Sutter treated all comers with the utmost generosity and liberality; no white man was turned away because of inability to pay for food or lodging. The first gold diggings were discovered about twenty-five miles eastward from the fort, which became the chief trading point between San Francisco and the mines. The adventurers ascended the Sacramento River to the mouth of the American, where they landed, and their goods were taken by ox-wagons to the fort, two miles distant, where they prepared themselves for the land journey. Before the first year of gold mining had come to an end, it was evident there must be a town on the bank of the Sacramento at the mouth of the American; so the present town site was laid off in October, 1848, and the New Year's day following, the building of the first house, (of logs) near the Sacramento River, was commenced. On the 8th of January the lots were sold by auction, and were described as lying in the town of "Sacramento." The fort and its vicinity continued to be the chief place of business until April, 1849, when the bank of the Sacramento was found to be much more convenient for purposes of business, and the merchants and traders moved. The town very soon became the most important center of trade and population in the State, next to San Francisco, and it has continued to hold the same relative position, growing with the growth of the State, notwithstanding many severe disasters to which it has been exposed. In 1851 there was a serious riot about land titles; on the 3d of November, 1852, the greater part of the town, including six hundred houses, was destroyed by fire, with a pecuniary loss estimated at the time at $5,000,000; and the city was flooded in January, 1850, in March, 1852, in January, 1853, in December, 1861, and in January and February, 1862. In 1853 the business part of the town was raised about five feet, the streets being filled in with gravel to that depth, and a levee or embankment was built round the city, extending about a mile along the bank of the Sacramento, and three or four miles along the bank of the American. The flood of 1861 and '62 proved extremely disastrous. It filled every part of the city; was three feet deep in every street—in some places fifteen feet deep. Gardens were destroyed, fences carried away, domestic animals drowned, furniture ruined, and many of the people driven to take refuge in San Francisco and other towns not afflicted by the general scourge. The business district has since been raised above the level of the flood of 1862, and the embankment of the Central Pacific Railroad coming from the north is a great protection to the district which has not yet been filled in.

The town has many elegant residences and gardens, and the vegetation is very luxuriant in the summer. E. B. Crocker has a private gallery of oil paintings, including many of great merit.

The State Capitol is 286 feet long, 142 wide, and 220 high to the top of its dome; and its design is creditable as a work of architectural art. The cost was about two and a half million dollars.

The site of the town was badly chosen, but the establishment of the State Capitol there, and the policy of the Central Pacific Railroad Company in making it a center for their lines, and building most of their workshops there, has maintained its prosperity.

Its population in 1870, according to the Federal Census, was 16,283, but 20,000 is the figure generally accepted for the present time. The number of votes cast at the presidential election in 1872, was 3,509.

§ 45. *Oakland.*—Oakland is the prettiest town in California, and (so far as my observation goes) in the United States, and owes its superiority mainly to the luxuriance, variety, and beauty of its vegetation, and the elegance of its dwellings. It is a suburb of San Francisco, and the residence of many wealthy men doing business in the city. Having very little trade, its houses are nearly all dwellings, and land is cheap as compared with the metropolis. Many of the homes are surrounded by fine gardens; and enough of the indigenous evergreen oaks have been left to almost hide the houses in some parts of the town, and to make the name strikingly appropriate. The site is level; the streets are well macadamized; and three horse, and two steam railroads furnish convenient and cheap means of access to the neighboring country. The State University, and the Deaf, Dumb, and Blind Asylum, are beautifully situated at the base of the mountains. The population, in 1870, was 10,500, and in 1872, the number of voters was 1,877.

At Oakland, the track of the Central Pacific Railroad ends; but on account of the lack of harbor facilities, it is not the terminus. The business is done in San Francisco, which is reached by a wharf extending a mile and a half across the mud flat out to deep water, and a ferry boat running two miles and a half. This wharf was built at an expense of more than a million dollars, but is not considered a permanent structure, as the teredo, or shipworm, has commenced to eat the piles. A plan has been proposed for the construction of an artificial harbor in San Antonio Creek, which is the southern boundary of Oakland, and, for a length of a mile and a half, has a width of three hundred yards or more, and at its head has two lakes or tide water basins, covering an area of nine hundred acres. The creek, through much of its length, has a depth varying from ten to twenty feet at low tide, but in front of the mouth of the creek, and all along the Oakland shore, a mud flat, covered by less than two feet of water at low tide, extends out into the bay, and the ship channel is more than a mile distant from the upland. Having no natural harbor accessible for large vessels, except the anchorage alongside the present wharf, which is a temporary structure, Oakland has been unable to derive any profit from her extensive water front, but a plan has been proposed for making an artificial harbor.

This plan is practicable and important. It contemplates the construction of walls three hundred yards apart, from the mouth of the creek to deep water, thus extending the creek out to ship channel, and avoiding the mud flat which now prevents ships from reaching Oakland. The basins at the head of the creek will supply a large area of tide water, which will sweep through the channel four times a day and preserve its depth, and perhaps even clean it at first without dredging. The construction of the walls in durable style would cost several million dollars, but would add five times as much as its cost to the market value of Oakland property. Such a harbor nearly three miles long, 300 yards wide, and twenty feet deep, with five miles of excellent frontage, would be more commodious, secure, and convenient of access, than some harbors of considerable seaports in Europe; and by its construction, Oakland would be fitted to become the main railroad terminus of California. The influence of the Railroad Company would be sufficient to transfer thither a large part of the business now done at San Francisco.

The people of Oakland have contemplated the construction of this harbor for several years, and several efforts have been made to organize companies to undertake the work; but capitalists would not take hold without a promise from the Railroad Company that it would make Oakland the main terminus of all its roads. At present, a proposition is under consideration to get a Federal appropriation to make the harbor; and as Congress has been accustomed to improve harbors not so good by nature, nor so favorably situated for business as this, the measure might pass, especially with such powerful lobby influences as could be brought to bear in favor of the project. Congress has ordered a survey of the creek, and a favorable report has been made on the practicability of the project.

§ 46. *San José and Santa Clara.*—San José, fifty miles southward from San Francisco, the chief town of the rich Santa Clara Valley, had a population of 9,089 in 1870, and cast 1,657 votes in 1872. The town was laid out about the beginning of the century, and some of the houses are of adobe, and were built before the American conquest. The streets are lined with shade-trees, the gardens filled with beautiful ornamental trees, fruit-trees, and flowers, and the dwellings are elegant. There are eleven hundred acres of orchard in the vicinity. Artesian wells are numerous, and are of great value. One of the boasts of San José is the "Alameda," an avenue three miles long, reaching to Santa Clara, lined with willow and cottonwood trees. The trees stand close together, and are of large size, so that they form a dense shade, and between runs a horse railroad, and also a turnpike.

Santa Clara, three miles westward of San José, and connected with it by the Alameda, is a new town, and nearly all the houses are of wood. The principal building is the old mission church, erected in 1822. It is now used as part of a Jesuit College. The mission of Santa Clara was founded in 1777, and a church was built on the bank of the Guadalupe Creek, at a place called "Socoistika," the Indian name of the laurel-trees which grew there. Two years later this building was swept away by a flood, and in 1781 a new church was commenced, half a league distant from the river, in a grove of oak-trees, the Indian name of which, "Gerguensen," was given to the vicinity. This church was destroyed by an earthquake in 1818. The population in 1870 was 3,469.

§ 47. *Stockton.*—Stockton had a population of 10,066 in 1870, and was inferior to Oakland in that respect, and in 1872 cast 1397 votes (less than the number cast in Vallejo, Oakland, or San Jose); but it may still fairly claim to be the third town in the State as a business center, and it may continue to improve in the future, being the main river port of the great San Joaquin Valley. The town is situated on Stockton Slough, ten miles from the San Joaquin River, and 125 miles from San Francisco by the steamboat route. Boats drawing five feet can reach the town at ordinary stages of low water, but the channels are narrow and crooked. The tide rises about a foot. The town has a pleasant appearance. Many of the dwellings are neatly built, and are surrounded by elegant gardens. Shade-trees are abundant. Fresh water is supplied to the city, for domestic purposes and for irrigating the gardens, by one hundred and fifty windmills, which pump it up through lead pipes, thrust down twenty feet deep into auger holes two inches wide. So abundant is the water in the soil at that depth, that there is no difficulty in obtaining it in this manner. Stockton is nick-named "The City of Windmills," and indeed the name appears very appropriate to the traveler who approaches the town on a windy day, and at a distance sees little save a multitude of great arms revolving furiously above and among the trees and house-tops.

The first settlement on the place was made in 1844 by Charles M. Weber and Mr. Gulnac, the latter of whom obtained a grant of the land from the Mexican government in that year. They had some trouble with the Indians, and Gulnac sold out to his partner, who would not give the rancho up; and afterwards, when the place became important for its commercial advantages, he became the founder and father of the town, where he still resides. The name was selected in honor of Commodore Stockton, who commanded the American naval forces on this coast during the war with Mexico, and contributed much to the conquest of California. The town, like Sacramento and Marysville, was overflowed during the great flood of 1862, the water having covered all the streets on the 11th of January, and stood for days more than a foot deep, in the highest of them.

The Central Pacific Railroad runs through Stockton, and a railroad twenty miles long, from Milton, in Calaveras County, terminates there.

A company has been organized to cut a canal thirteen miles long, from Stockton to Venice, on the San Joaquin River, below which point the channel is twenty feet deep, and more than a hundred yards wide. Gen. B. S. Alexander, having examined the country, has made a written report, to the effect that the project is practicable, and that a canal 106 feet wide at the water line, 20 feet deep at mean tide, and 12 miles long, will cost $1,207,000 with certain basins and canals. He adds that "the day is coming, if it has not already come, when the San Joaquin Valley will demand a cheaper outlet for its productions than it is possible to obtain by railroad or a system of railroads, and a narrow, crooked, and shallow river." The company propose to reduce the expense to $843,000 by reducing the width three feet, the depth one foot, and omitting several of the basins designed for turn-outs and other purposes.

The San Joaquin Valley Railroad forms a junction with the Central Pacific at Lathrop, eight miles south of Stockton.

§ 48. *Vallejo and Carquinez.*—Vallejo, situated on an arm of San Pablo Bay, called Napa Bay, Vallejo Bay, or Mare Island Strait, is twenty-three miles from San Francisco in a northeastward direction; the harbor is five miles long, a quarter of a mile wide, thirty feet deep, with excellent protection against the winds, and good holding ground. The channel from the Golden Gate is a mile wide, twenty-five feet deep at low tide at the shallowest place, and distinctly marked by prominent headlands. The winds are constant, and there are no rocks to endanger navigation. The site of the town is an extensive plain, which comes down very near to deep water, presenting the best natural water front for large vessels on the waters tributary to the Golden Gate, the shore elsewhere being either rocky, bluff, or mud-flat. The town has now more wharves constructed with much less expense than those accessible for ships elsewhere. The site is at the head of ocean navigation, and being only sixty miles from Sacramento in a direct line, is in a good position to be the point where the cars and ships should meet in the future, as they must meet. The water in the harbor is brackish, and the teredo cannot live there. The supply of fresh water is abundant and cheap.

The population in 1870 was 7,391, (less than that of Oakland, Stockton, or San José) but in 1872 it cast 2,147 votes, surpassing all those places, and ranking next to Sacramento in that respect.

A great future has been predicted for Vallejo, but the predictions have remained without fulfillment for many years. Forty-seven ships were loaded there with grain for Europe in the twelve months ending June 30th, 1873. Railroads run from the town to Sacramento, Knight's Landing, Woodland, Vacaville, and Calistoga. The town was laid out in 1850 by M. G. Vallejo, for the capital of the State. He owned large tracts of land, then estimated to be worth several millions of dollars. Among his possessions was the Suscol Rancho, and he was induced to believe that if he would lay off a town and make a liberal offer of land and money to the State, the capital would be established there, and increase the value of his land so much that he would profit largely by the affair. The suggestion appeared reasonable, and he adopted it, offering much land and three hundred and seventy thousand dollars in cash for the establishment of the capital at Vallejo—the three hundred and seventy thousand dollars to be spent in erecting public buildings. The offer was accepted, and the capital was located at Vallejo, but the Legislature went thither at a time when there were no houses there, and they immediately went away. Señor Vallejo did not pay the money which he had offered, and finally the capital was established at Sacramento, where it is likely to remain. The business of Vallejo now depends chiefly upon the United States Navy-yard and Dry-dock, on Mare Island.

Benicia, on the north bank of the Strait of Carquinez or the Silver Gate, may be regarded as a suburb of Vallejo, from which it is six miles distant. The two towns are really twins in interest, and each has decided advantages lacking to the other. The Strait of Carquinez is the natural center for the land and water travel of the State, but the water front of Benicia is a swamp, and it has obstructed the progress of the town. It was laid out in 1847; for a time it aspired to be the great commercial city of the Coast, which aspiration it did not abandon until as late as 1853. It was twice made the State capital, and twice deserted by the Legislature. The houses are scattered about so far from each other that the town is called, in sport, "The City of Magnificent Distances." A ferry-boat crosses the strait to Carquinez about six or eight times every day. The population, in 1870, was 1,656.

Martinez, on the southern side of the Strait of Carquinez, and nearly opposite Benicia, had a population of only 560 in 1870, but may become an important town under the influence of the Central Pacific Railroad, which will pass through the town on its way from Stockton to Oakland, and will thus bring much of the travel of the State to the strait. A wide and shallow mud flat lies in front of Martinez, but west of the town the channel is deep near the shore; and as the railroad is to follow the shore line, warehouses will be built between the track and the channel, and there much of the wheat of the San Joaquin Valley will probably be loaded for Europe. A steam-ferry boat connects Martinez with Benicia. The town is sheltered by high hills from the west and south; west, whence the prevalent winds come, and the fog, blown upland from the Golden Gate passes to the northward, leaving Martinez and vicinity in the sunshine many days, while Benicia is covered with a cloud.

The town of Pacheco was founded in 1858. It is built at the head of navigation of the Pacheco Slough, and is the shipping port of Pacheco, San Ramon, Diablo, and Nassau valleys. The distance to Martinez is four miles, further than farmers like to haul their grain, when they can avoid it. The slough is bare at low water; at high water it is navigable for sloops and schooners drawing six feet. The population is about 1,000. The town will probably lose much of its importance after the completion of the Bantas, Martinez, and Oakland Railroad.

§ 49. *Los Angeles.*—The town of Los Angeles, formerly called *Pueblo de los Angeles*, or the Pueblo de la Reina de los Angeles—the town of the Queen of the Angels—the largest town in the southern part of the State, had a population of 5,728 in 1870. It was founded about 1780, and was a considerable town previous to the American conquest, but the finest buildings in the place have been erected within the last twelve years. The town is situated on the western bank of the Los Angeles River, where that stream breaks through the range of low hills, twenty miles north of the bay of San Pedro. The streets are mostly of good width, but are not straight; do not cross each other at right angles, are not graded, nor are they paved. All the old houses are built of adobes, and most of them are of one story, with flat roofs of asphaltum. The new houses are of wood and brick. On the northwestern side of the town, and very near to the most busy part of it, is a hill about sixty feet high, whence an excellent view of the whole place may be obtained. The vineyards and gardens are beautiful. There are 2,500 or 3,000 acres of brilliant green—

the largest body of land in vineyard, garden, and orchard within so small a space in the State. The fences fix the attention of the stranger. They are made of willow trees, planted from nine inches to two feet apart, the spaces between the trunks being filled with poles and brush. After the fences, the stranger's notice is attracted by the *zanjas*, or irrigating ditches, which run through the town in every direction. These *zanjas* vary in size, but most of them have a body of water three feet wide and a foot deep, running at a speed of five miles an hour. They carry the water from the river to the gardens, and are absolutely necessary to secure the growth of the fences, vines, and many of the fruit-trees, at least when young. One of the officers of the town is the *zanjero,* whose duty it is to take charge of the *zanjas*, see that they are kept in order, and that the water is equally distributed among those entitled to it. Entering the enclosures, we are among the vines, orange, lemon, lime, citron, pear, apple, peach, olive, fig, and walnut trees. Many of the vines are from ten to thirty years of age. The population of the place may be described as of three nearly equal classes, Americans, Europeans, and Spanish Californians. The Americans own most of the houses and land in the town, the Europeans probably do most of its trade. The town is the seat of the county government, and the chief business place in this part of the State. The general impression upon my mind, after spending the last week in September in the place, is that it is one of the most pleasant places, known to me, to visit. The luxuriant vegetation, with its sub-tropical character, is peculiarly agreeable to the sons of the North. The " clime of the sun," " the land of the cypress and myrtle," where the citron blooms and the golden oranges glow amidst the dark-green leaves, have ever been with the poets of the colder lands the symbols of a terrestrial paradise, and some of the most brilliant verses of Goethe and Byron have been inspired by admiration of them.

The song of Mignon came vividly before me as I walked through the gardens of the City of the Angels.

> "Know'st thou the land where the lemon trees bloom,
> Where the gold orange glows in the green thicket's gloom,
> Where the wind ever soft from the blue heaven blows,
> And groves are of myrtle and olive and rose?"

Luscious fruits, of many species and unnumbered varieties, loaded the trees. Gentle breezes came through the bowers. The water rippled musically through the zanjas. Delicious odors came from all the most fragrant flowers of the temperate zone. Julius Froebel speaks thus of Los Angeles in his book, *Aus Amerika:* "I could wish no better home for myself and my friends than such a one as noble, sensible men could here make for themselves. Nature has preserved here, in its workings and phenomena, that medium between too much and too little, which was one of the great conditions of high civilization in the classic regions of ancient times. Indeed, when we seek in other lands for places like Los Angeles and Southern California generally, we must turn our eyes to the Levant. In the United States there are [in 1858] no kindred spots." The town is situated on the banks of the Los Angeles River, twenty-five miles from the ocean.

Dr. J. W. Hough writes thus: "The general view of Los Angeles, from the old Fort, more nearly resembles that of Damascus, 'the pearl of the Orient,' than any city I have elsewhere seen. The hills skirt it on the north and west, as the range of Anti-Lebanon does the eastern city; while from them your eye sweeps over the same broad, brown plain, in the midst of which lies an island of verdure, (*El Merj*, or the meadows, the Arabs call it) with the city embowered in its midst. True, there are no minarets rising from the modern town, and the Los Angeles River is a poor substitute for the ancient Abana; nor are the desert schooners, which take their departure for the Colorado River, much like the caravans which leave for the Euphrates. But the vineyards have the same luxuriance, the pomegranates the same real blossom, and the orange-groves the same ravishing beauty, while an occasional palm, stateliest of trees, gives an oriental air to the scene. One misses the ocean view, and the mountains lie away upon the horizon; the city itself is rather irregular and has but few fine buildings. The beauty is in the environs, where lovely cottages and lofty mansions peep out from amid bowers in which lemons and limes and apricots are mingled with oranges and walnuts and grapes.

"Los Angeles owes its future promise, as Damascus does its past greatness, to the water which flows so freely in its zanjas, and to its situation with reference to the interior country. It lies on the lap of a wide farming country, and in the midst of thrifty settlements, such as El Monte, Los Nietos, Anaheim, and Compton, while one who stands at the depot, and sees now and then a car load of bullion passing down to the sea, or a great wagon loading for Arizona, discerns therein the promise of a mighty inland traffic, which, unless diverted when the railroad system of the region shall be determined, must make Los Angeles an important center."

The embarcadero, or shipping point of Los Angeles, was San Pedro, twenty-five miles distant to the southward, where a couple of houses sheltered the few people who found occupation in the scanty trade, until 1858, when a small steamer was obtained, and used to transport freight from the anchorage of the ocean steamers at the San Pedro roadstead, four miles up an estuary to Wilmington, which soon grew into a little town, and now has a population of 1,000. In 1871, Congress appropriated $200,000 to build a breakwater, to make an artificial harbor, and afterwards $225,000 more; and the work is now rapidly approaching completion. Some able engineers and navigators have expressed the opinion that the breakwater would be worthless, and that the harbor would have to be built further out; but the Los Angeles papers say there is no longer room to doubt the success of the present structure. If this statement be true, the harbor will be at New San Pedro, about half-way between Wilmington and old San Pedro, and twenty-three miles from Los Angeles. Whether the breakwater be a success or not, it is certain that an artificial harbor must be made to accommodate the rich and extensive country north and east of San Pedro. The Los Angeles people claim that, as the Texas and Pacific Railroad will cross the Coast mountains at San Gorgonio Pass, eighty miles east of their town, and the same distance north of San Diego, its main terminus must be at New San Pedro.

§ 50. *San Diego.*—San Diego, which had a population of 2,300 in 1870, and has gained several hundred in the last three years, has been made by Congress the western terminus of the Texas and Pacific Railroad, now in progress of construction. The distance by this road from the Pacific to the Gulf of Mexico, at Galveston, is only 1,500 miles, whereas from San Francisco to New York the distance is 3,300 miles. The San Diego people predict that when their road shall be completed, it will be preferred to the middle Pacific for the transportation of freight between Asia and the Atlantic cities, and they argue that their town will be the rival or equal of San Francisco. The harbor of San Diego is excellent, and in many respects unsurpassed; but the entrance is only twenty-five feet deep at high water, and calms off the coast frequently render it difficult for sailing vessels to enter or leave the harbor for days at a time, whereas, two hundred miles farther north, the trade winds are almost constant.

The vicinity of San Diego is poor in agricultural resources. The town is in the southwestern corner of a county which is sixty miles from north to south, and one hundred and twenty miles from the ocean to the Colorado, and that vast area has only 5,000 inhabitants, and only 15,000 acres under cultivation, or three acres to the person. The population of the city is 2,300, and 7,000 square miles in the county have only 2,700 inhabitants, or less than one person to two square miles. The western third of the county is nearly all rugged mountains, unfit for tillage, and the eastern two-thirds is desert, though much of it may be reclaimed. The rivers are small and short, and their valleys narrow. Not one irrigating ditch is reported for San Diego County, though the average annual rainfall is only four inches. The soil is rich in the valleys, and, where moist, is very productive.

The town must rely mainly on the railroad for the fulfillment of its hopes of active business, though, as a health resort, it will always remain in favor. It has excellent accommodations for travelers, and is a touching point for the mail steamers between San Francisco and Panama.

§ 51. *Anaheim.*—Anaheim is the only German town in the State. It was laid out by Germans, built up by Germans, and is in the main populated and owned by Germans. But it will never have the foreign character which marks many German villages in the valley States of the Mississippi, where the English language is not known to any of the people. None of the Anaheimers have come direct from Germany: all of them have lived for some time elsewhere in the United States, and most of them speak English fluently. The English language will be the predominant tongue, although German will long be cherished. Anaheim is a tract of land a mile wide by a mile and a half long, in the valley of the Santa Ana River, Los Angeles County. It was unoccupied, and supposed to be of little value in 1857, when it was bought for two dollars an acre by a German company of fifty members, mostly residing in San Francisco. They were incorporated as a joint-stock association. The land, containing one thousand one hundred and sixty-eight acres, was divided into fifty lots of twenty acres each, with a little town plat in the middle, and convenient streets. The place was given in charge of a superintendent, who held his position two years, in which time he planted and cultivated eight acres of every lot with vines, and put willow hedges (nearly all the fences in Los Angeles County are of willow) around the outer boundary of the tract, and along the principal streets inside. During a large part of the time he hired fifty laborers. The total expense for the two years was seventy thousand dollars, or one thousand four hundred dollars per lot of twenty acres, including eight acres of vine. The owner of a vineyard lot had a little town lot of half an acre besides. In December, 1859, the property was divided by lot among the members, many of whom afterwards moved to the place and made their homes there. Anaheim has some advantages over Los Angeles in the regularity of its plan, and perhaps, also, in location, (for it is nearer the ocean, and farther from the snowy mountains) and in the extent of rich land in its neighborhood, and in its location near the direct line of travel between Wilmington and San Bernardino. It is almost as beautiful as Los Angeles, and in many respects bears a great resemblance to that town. The population was 881 in 1870.

§ 52. *Santa Barbara.*—Santa Barbara, in latitude 34° 24′, on a shore that runs east and west, 50 miles eastward from Point Argüello at the southern base of the Santa Inez mountain range, which shelters it from the north winds, is now one of the most prosperous towns in the State, having more than doubled its population in the last five years. The number of inhabitants in 1870 was 4,000. Its chief attraction is the climate, and many of the new settlers are invalids from the Atlantic States. Congress has ordered an examination of the estuary of the town, to determine whether an artificial harbor can be made there. The town has excellent hotels, and nice gardens.

§ 53. *Petaluma.*—Petaluma, forty miles north of San Francisco, and ten miles from the mouth of Petaluma Creek, is the main town of a rich valley, and in 1860 was the eighth town of the State, and was growing with great rapidity, being then the only outlet of Santa Rosa and Russian Valleys. But it was a slough port, and when a railroad was built through the valley with a terminus four miles below the town, it began to decline, and it has lost some of its voters, and a considerable portion of its trade. The population in 1870 was 4,588.

§ 54. *Grass Valley.*—Grass Valley, the chief quartz mining town of the State, is 2,500 feet above the level of the sea, and thirteen miles north of Colfax, on the Central Pacific Railroad. The site is in the midst of an amphitheater of gently rolling hills, which have a fertile red soil, and are covered either by nice little homesteads and gardens, or by a multitude of young pine trees, which have arisen to take the place of the older trees, cut down to supply firewood or shafting timber. A large area is occupied by residences. Several square miles must be included within the town plat. There is abundant room for the orchards and gardens which surround many of the dwellings. The ugly piles of boulders, the bare rock, and the deep excavations on the hill-sides, which show the ravages of the placer miner, are not seen here. This is the home of the quartz miner, who has built a comfortable house, surrounded it with flowers, and fixed himself to enjoy life with his family. Unlike most of the placer mining camps, this is a beautiful town, and it has an appearance of comfort and permanence and steady prosperity that would do no discredit to a thrifty New England village. There is now in the township a population of 7,000, most of whom are collected in the town. The business is sufficient to pay a fair profit, if it were evenly divided, to many more. The township is the greatest center for gold-quartz mining in the world, and the annual gold yield is estimated at $4,000,000. There are here, within a small area, a number of the richest mines in the State. The miners of Grass Valley have two serious disadvantages: the lodes are very narrow, and water is found abundantly at a depth of 50 or 75 feet. But the richness of the rock, and the proximity to the centers of the population, have more than counterbalanced the drawbacks.

§ 55. *Marysville.*—From 1855 to 1860, Marysville was the first in beauty, and the third in population and trade, among the towns of the State, but it was a river port, and lost much of its trade when the Central Pacific Railroad gave access by rail to the mines of Nevada and Butte; and moreover, the production and trade of the mining counties, which formerly got their supplies through Marysville, began to decline rapidly about the time when the roads were built. Thus it is that in 1872 Marysville cast only 833 votes, whereas, in 1860, it had cast 1,871. The population, in 1870, was 4,738. It lies between the Feather and Yuba Rivers, at their junction. The site, like that of Sacramento, is flat, and in the midst of the large valley, and has been raised artificially above its natural level to protect the houses against floods. Marysville resembles Sacramento, though smaller. The first settlement was made in 1841 by Theodore Cordua, a German, who built a couple of adobe houses, and called the place New Mecklenburg. In 1849 several persons built shanties, and the place was called Yubaville. In January, 1850, the town was laid off, and named after Mrs. Mary Covillaud, the wife of the chief proprietor. On the 31st of August and the 10th of September, 1851, two large fires occurred, destroying almost the whole town. In the spring of 1852 the business part of the town was covered with water, and the next year it was raised twelve feet. The town was again flooded in December, 1861, and January, 1862. Marysville is at the head of navigation on the Feather River. The distance by water is about seventy miles from Sacramento; by the railroad it is forty-five miles.

§ 56. *Visalia.*—Visalia is situated in the "Four Creek country," about fifteen miles northeastward from Tulare Lake. The "Four Creek country" is formed by Cahuilla Creek, which, after leaving the Sierra Nevada, spreads out into a number of channels, and these again subdivide, and moistening a considerable district of rich soil, render it very productive. Visalia has a population of 1,626. It promised to become one of the leading towns of the State, until 1872, when the railroad was built through the valley, passing seven miles to the westward, thus cutting off the main trade, and laying the foundation of a rival town at Goshen. The town was overflowed in the flood of 1862, and the water was two feet deep in the main street.

§ 57. *Suisun.*—Suisun, a village of about sixty houses, is on the western bank of Suisun Slough, in Solano County, about ten miles, in a direct line, from Suisun Bay, and sixteen miles by the slough. The place was commenced on a little island, a couple of hundred yards in diameter, and no part of it more than a foot above the highest tide. It is surrounded by tules, or salt-water rushes, growing on land overflowed at every high tide, and bare at low tide. Two roads lead from the dry land of the valley to the city—one of them a plank-road, and now in a very dilapidated condition. Most of the streets are subject to overflow by spring tides, and the marks of the water can be seen upon them, even when dry. A few lots have been raised above high tide, by bringing earth from other places; and enclosures are made by digging ditches, in which the water is never more than two feet below the surface. The island, being in the tule, was not included in the Suisun grant, and it was claimed, in 1853, by two men who laid off the town. The place owed its importance to its advantages as the shipping point of the valley; but the construction of the California Pacific Pailroad has cut off much of its trade, and its prosperity has been declining for several years. The population, in 1870, was 462. The town is one mile from dry land, on the edge whereof, immediately north of Suisun, lies Fairfield, which is the county seat, and has three hundred and twenty-nine inhabitants.

§ 58. *Yreka.*—Yreka is situated at an elevation of fifteen hundred feet above the sea, in the valley of Shasta River, about twenty miles northwest from Mount Shasta. It is a mining town, being situated in a rich district, and founded on pay-dirt. The place is surrounded by high mountains, the Siskiyou ridge on the north, the Sierra Nevada on the east, the Scott and Trinity ridges on the south, and the Coast Range on the west, and is shut in by snows during part of every winter. Much of the merchandise sent out from this point to mining camps in the vicinity, goes on pack-mules. The goods imported by Yreka are hauled eighty miles, by horses, from Redding, the end of the railroad. The town is on the main road between the Sacramento and Willamette Valleys, and occupies a central position in the basin of the Klamath River, and will probably maintain its importance, if the railroad be built to run through it. The population, in 1870, was 1,063.

§ 59. *Napa.*—Napa was laid off in 1848, by Nathan Coombs, at the ford of Napa River, on the road from Benicia to Sonoma. In those days there were no bridges or ferries, and the ford and the head of navigation for sloops determined the location of the town. Now the ford is never used, but the investment of capital has made the town permanent. The railroad runs through the town, and has been of great benefit. It is now a beautiful and growing place. A Branch Insane Asylum is being built near Napa. The population in 1870 was 1,879.

§ 60. *Crescent City.*—Crescent City is a seaport, fifteen miles south of the Oregon line, and in 1870 had 458 inhabitants. The place was founded in 1853, with the expectation that, because of its proximity to the mines of the Klamath and Rogue River basins, it would become an important commercial point for the imports of Southern Oregon and Northern California. Its founders, however, were disappointed in this expectation. The people at the head of the Sacramento Valley, knowing that an attempt was making to cut off a large part of their trade, went to work industriously and made a good wagon road to Yreka, and thus reduced the freights to that place very much. The country westward of Yreka is rugged, and as the people of Crescent City had not the capital to make a wagon road, their goods had to be transported at much expense on mules; and Yreka and vicinity continue to make their imports and exports by way of the Sacramento Valley. Crescent City, therefore, remains a small place, but it supplies a district within a range of forty or fifty miles to the east and northeast. Trinidad, a small seaport, is the chief trading point of the miners in Klamath County.

§ 61. *Humboldt Bay Towns.*—The principal town on Humboldt Bay is Eureka, which had 2,049 inhabitants in 1870. Arcata had 924, and Bucksport, 388. Eureka has the main shipping business, Arcata being situated behind a wide mud flat. The latter town was long the more important, and in 1862, 1,500 pack-mules were employed in conveying goods to the mines in Trinity and Klamath Counties. Eureka is the only town of over two thousand inhabitants in the State without a telegraphic line.

CHAPTER III.

CLIMATE.

§ 62. *Main Features.*—One of the chief advantages of California is its admirable climate. After a careful study of all the accessible books relating to the subject—and their number is large—I claim and believe it to be more conducive to health and comfort, and intellectual and physical activity, than that of any other country in the world. Other climates may be better, but if so their meterological statistics are not within my reach, and they may belong to countries objectionable on account of their isolated situation or the semi-civilized condition of their inhabitants. Among these may be Tasmania, and certain districts in the mountains of Mexico and South America.

The climate of the valleys in California is unlike that of every other country, and particularly dissimilar to that of the American States east of the Rocky Mountains, resembling in general character that of Spain. Its chief peculiarities, as distinguished from the Eastern States, are, that the winters are warmer; the summers—especially at night—cooler; the changes from heat to cold not so great nor so frequent; the quantity of rain less, and confined principally to the winter and spring months; the atmosphere drier; the cloudy days fewer; violent wind storms, thunder, lightning, hail, snow, ice, and the aurora borealis, rarer; and the winds more regular—blowing from the north for fair weather, and from the south for rain.

§ 63. *Many Climates.*—The State reaches through nearly nine and a half degrees of latitude. San Diego is as far south as Charleston, three and a half degrees south of Gibraltar, and near the parallel of Jerusalem and Shanghae; and Crescent City is as far north as Chicago, Providence, Rome, and Constantinople. Italy has the same general shape, direction, and length as California, but is five degrees further north. Much of the Golden State has the winter of South Carolina, and the summer of Rhode Island. The orange, the lemon, the olive, the fig, the pomegranate, the vine, the peach, the apple, wheat, and barley, all find most congenial climes in California.

The State, indeed, has many climates; one for the western slope of the Coast Range, between Point Argüello and Cape Mendocino; another for the low land of the Sacramento Basin; another for the Sierra Nevada and Klamath Basin; another for the Great Basin of Utah; another for the coast south of Point Conception; and still another for the Colorado Desert.

The causes of these peculiarities of climate are chiefly to be found in the position of the country—a narrow strip on the western side of the continent, bounded on the east by a high range of mountains that shuts the coast off from all the influences of the interior; bordering on the wide Pacific Ocean, washed by a warm current flowing across from the China Sea; with a shore line that runs nearly north and south, and is exposed in all its length to the strong winds constantly blowing southeastward over the ocean; and with a large, dry plain in the middle of the State; and a hot, arid desert in the southeastern corner.

§ 64. *Sea Breeze.*—The sea breeze is a prominent feature in the climate of California. Nearly every day the wind blows from the ocean to the land. In the summer its force is stronger than in the winter, on account of the great heat of the earth in the Sacramento-San Joaquin, Mojave, and Colorado Basins. The air there rises after becoming warm, and its place must be supplied by the breezes from the ocean. These leave the surface of the Pacific ordinarily with a temperature of 50°, and as they advance inland, it rises. Thus, the mean temperature of July in San Francisco is 57°, in Vallejo 63°, Sacramento 73°, and St. Helena 77°, the difference being due to the greater or less exposure of these several places to the winds from the ocean. Two valleys, on the same level, only five miles apart, but separated by a high mountain ridge which protects the more eastern of the two from the sea breeze, may have a difference of 10° in their summer weather.

Strong winds blow almost constantly through the gaps in the Coast ridge.

As the sea breeze prevails in the day-time, so the land breeze comes in the summer nights, and although not strong enough to be noticed in many parts of the State, it is regularly felt in certain gaps on the southern coast, and in cañons of the Sierra Nevada. The air pouring down from the snow of the summit of the Sierra, helps to cool the nights in the valleys.

§ 65. *Middle Coast.*—On the coast, between latitudes 35° and 40°, there is little difference in the temperatures of winter and summer. San Francisco is in the same latitude with Seville, Palermo, Smyrna, Washington, and St. Louis, but knows neither the cold winters nor the hot summers which afflict American cities east of the Rocky Mountains in the same latitude. Ice is rarely formed in the Californian metropolis, and never more than an inch in thickness; and the thermometer never stays at the freezing point twenty-four consecutive hours. The lowest point which the thermometer has ever reached in San Francisco, since observations have been taken, was 22° Fahrenheit in January, 1862; and previous to that time it had never fallen below 25°; while in St. Louis it goes down to 12° every winter, and remains near that figure for many consecutive days. The mean temperature of January at sunrise is 44°, and the coldest noon, according to Dr. H. Gibbons, between 1850 and 1868, was 37°. In three years out of five the thermometer does not fall to 32° in the daytime, though a year rarely passes without frost formed at night. Rome has a day and a half of snow in average winters; and in San Francisco I have never seen the streets in a mantle of white in a residence of more than twenty years. In St. Louis, the winter months rarely have a day which is really comfortable in the open air; while half the season is so in San Francisco, the sky being clear, the sun warm, and the breezes gentle, so that the weather bears a strong resemblance in temperature to the Indian Summer in the upper Mississippi basin. Our coldest winter days, at noon, are as warm as the warmest in Philadelphia.

On the other hand, the summers are cool or cold. In November, 1854, the lowest figure reached by the thermometer in San Francisco, was 47°, while in July of the same year it was at 46°—showing that at no time in the former month was it so cold as at one time in the latter, and the weather in neither month was exceptional for its season. The mean temperature of July is 57°, twenty-one degrees lower than in Washington city. There are, on an average, seven days in the year when the thermometer rises above 80°—at which figure heat first begins to be oppressive—while in St. Louis and at Washington there are in every year from sixty to ninety days that see that height. No matter how warm the day at noon, the evenings and mornings are always cool, and blankets are necessary—at least a pair of them—as a bed-covering every night. Although the mean temperature of summer differs little from that of winter, yet there are sometimes very warm days, which may be succeeded immediately by very cool nights.

Professor Robert Von Schlagintweit says that "the climate of California resembles in general character that of Italy, but has not its objectionable effect of depriving the people of the disposition and power of energetic mental and physical labor. The *dolce far niente* of the southern Italian is unknown in California."

Samuel Bowles writes that "there is a steady tone in the atmosphere like draughts of champagne or the subtle presence of iron. It invites to labor, and makes it possible. Horses can travel more miles here in a day than at the East, and men and women feel impelled to an unusual activity."

C. L. Brace thinks that "it is the most exhilarating atmosphere in the world."

The London *Spectator* said, editorially, that the climate of California is that of Greece cooled, and the climate of Tasmania is that of England etherealized, and the two are the nearest perfection in the world.

§ 66. *San Francisco.*—San Francisco seldom suffers more than three hot days in succession. When the sun has had an opportunity to rage for so long a period, the air in the interior of the State becomes so hot, that it rises rapidly; and the ocean-winds, which must rush to supply the place, never fail to bring cool weather to the vicinity of the Golden Gate. Thus, the mercury has risen (and that was its highest) to 97°, and it often falls in July to 46°; and such a change of fifty degrees might occur within twelve hours. The average range of the thermometer in July and August is about 20°—from 50° to 70°. Yet, as the mornings and evenings are cool, and the noons are not always warm, "summer clothing" is seldom worn by men, and never for twelve consecutive hours. The common custom is, to wear woolen coats and trousers of the same thickness in summer and winter. The persons who visit San Francisco during the summer, from the interior of the State, where the climate from May to October is much warmer, and where summer clothes are worn, are much bothered at having to bring their winter clothes with them. The editor of a Stockton paper, disgusted with the climate of the metropolis in July, expressed himself somewhat after this manner: "You go out in the morning shivering, notwithstanding the fact that you are dressed in heavy woolen clothing, and under-clothing, and have a thick overcoat buttoned up to your throat. At 8.30, you unbutton two of the upper buttons; at 9, you unbutton the coat all the way down; at 9.30, you take it off; at 10, you take off your woolen coat, and put on a summer coat; at 11, you take off all your woolen and put on light summer clothing; at 2, it begins to grow cool, and you have to put on your woolen again; and by 7 o'clock, your overcoat is buttoned to the chin, and you shiver until bedtime."

The coolness of the summer is caused by the winds and fogs, which blow in from the ocean, whose temperature at the Farallones never varies more than a degree or two from 42°. A strong wind blows along the Coast from the north and northwest during almost the whole year; and it blows strongly upon the land for several hours after eleven o'clock in the morning, and after five in the evening, and not unfrequently it continues the whole twenty-four hours. The common prevalence of this wind during the afternoon, renders the mornings the pleasantest part of the summer weather in San Francisco; and the more delicate and fashionable ladies habitually make their calls and allow their children to go into the street only before mid-day. In June, July, and August, heavy, wet, cold mists come up from the sea at six in the evening, and continue until eight or nine in the morning. In the winter, fogs are rarer, and do not commence so early in the evenings, and the winds are not so strong; so that, in these respects, the winter is the pleasanter season of the year.

The mean temperatures of spring, summer, autumn, and winter, are 54°, 57°, 56°, and 50° respectively, showing a difference of only seven degrees between the average of winter and summer; whereas a similar comparison in the climate of New York city, shows a difference of thirty-nine degrees. There is a range of two degrees more in San Francisco by taking the months separately—January, the coldest month, having a mean temperature of 49°, and September, the warmest, a mean of 58°. October is as warm as July, and in some years it has been warmer. The mean of the whole year is 54°, a temperature that requires heavy woolen clothing for comfort. For vigorous, industrious men, the climate of San Francisco is the healthiest and most agreeable in the world. I prefer it to all others. But, to enjoy it, a man should have warm blood, full veins, and active habits; if he is weak or idle, he will find it too cool for him. It is a climate that allows a person to be out in the open air all the time; no hour is lost because of either excessive heat or excessive cold. Women do not like the climate so well as men; it is too cool for their less vigorous constitutions and sedentary habits.

San Francisco does not lie immediately on the ocean, but only six miles from it, and where there is a great gap to let in the winds and fogs. The nearer the Pacific, the denser and more frequent the fogs, the stronger the winds, the warmer the winters, and the cooler the summers. The great ocean is a powerful equalizer of climate: as you advance into the interior, the range of heat and cold becomes greater. In the coast valleys you can choose your distance. San Rafael is ten miles from the Pacific, Petaluma twenty, Sonoma thirty, Napa thirty-five, Suisun forty-five, and Vaca Valley fifty. Sonoma Valley has a delightful climate, free from fogs and cold winds, and yet blessed with a sea-breeze which tempers the heat of every summer day to the precise degree necessary to the perfect happiness of a man who wishes to take life without exertion, and the same may be said of Santa Clara, and many other valleys along the coast.

§ 67. *Hot Days.*—According to the self-registering thermometer kept in San Francisco by Thomas Tennent, in the twenty years preceding the 1st of January, 1872, the mercury rose on 136 different days to 80°. The average number of hot days in a year is less than seven. In 1861, 1862, and 1863, not one hot day occurred; in 1864, and 1871, two each; in 1869, four; and five years out of the twenty, had a dozen or more. The largest number in one year was twenty-two, in 1855. In the score of years, six hot days came in March, twelve in April, ten in May, fourteen each in June and July, eleven in August, forty-one in September, twenty-seven in October, and one in November. The average number of hot days is a fraction over two for September, which has more than any other month. A singular alteration appears between the six years from 1852 to 1857, inclusive, as compared with the next six from 1858 to 1863, inclusive. In the former period, the number of hot days in a year was never less than eleven, and the average was thirteen; while in the latter the highest was seven, and the average was less than three.

The following table shows the number of hot days in San Francisco, when the thermometer reached 80°, for every month between March and November, inclusive, in twenty years.

YEAR.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Total.
1852	2	2		1			8		1	14
1853			1	3			3	3		10
1854		1			4	2	2	3		12
1855	1	2	1	2	2	3	6	3		22
1856	3					3	3	2		11
1857		2		2		2	4	4		14
1858			1		2		3	1		7
1859			1	3				2		6
1860		1					2			3
1861										
1862										
1863										
1864								2		2
1865			2				3			5
1866		2		1						3
1867		2	1	2	4		4			13
1868								3		3
1869			1				3			4
1870			2		2	1		2		7
1871								2		2
Total	6	12	10	14	14	11	41	27	1	136

The number of hot days increases rapidly as we go inland and get away from the influence of the ocean winds.

§ 68. *Sunrise and Noon.*—The following table, showing the mean temperatures at sunrise and noon, was prepared by Dr. H. Gibbons.

MONTHS.	SUNRISE.	NOON.
	deg.	deg.
January	44	56
February	47	60
March	48	63
April	49	65
May	50	64
June	51	68
July	52	67
August	53	67
September	53·5	69
October	53	68
November	49	62
December	45	55
Yearly mean	49·5	63·7

The mean of sunrise rises regularly from January to September, but that of noon higher in June than in July and August. The strong winds called in from the ocean to supply the place of the air heated in the Sacramento-San Joaquin basin, reduce the temperature of midsummer in San Francisco.

§ 69. *Cold Days.*—The number of cold nights, those in which the thermometer fell, at San Francisco, to 32°, numbered seventy-four in the twenty years ending June 30th, 1872, (according to Thomas Tennent's self-registering thermometer) less than four to the year on an average. Of these seventy-four cold days, twenty-four occurred in December, thirty-three in January, eleven in February, four in March, and one each in April and May. In the winters of 1852–53, 1864–65, 1866–67, 1868–69, and 1871–72, or five out of twenty winters, not one cold day occurred.

The seasons of 1854–55, 1859–60, 1860–61, 1863–64, and 1865–66, had each one cold day.

The seasons of 1853–54, 1862–63, and 1869–70, had each three cold days.

There were four cold days in 1857–58; five in 1856–57; seven each in 1855–56, and 1870–71; eight in 1867–68; nine in 1858–59, and twenty-one in 1861–62.

§ 70. *San Francisco Fogs.*—Dr. H. Gibbons, speaking of the mists and fogs at San Francisco, says:

"It is curious to observe the conflict between the absorbing power of the air and the supplying power of the ocean, in regard to moisture. Toward noon, when the wind rises, huge columns of mist may be seen piled along the coast, three or four miles west of the city, and pouring in, like a deluge, upon the land. But the air of the land, which is always thirsty, drinks it up with astonishing avidity; so that the impending wave, though in a current moving from thirty to fifty miles an hour, makes slow progress. By the middle of the afternoon, it is within a mile or two of the city; and there it stands, like a solid mass of water, several hundred feet in depth, rolling and tumbling toward you, (not without grandeur and majesty) and threatening to overwhelm you in a few seconds. You await its coming, but it comes not; it even recedes, to return and recede again. Not until the sun has lost his calorific power, does the atmosphere reach the point of saturation; and then, toward sunset, or later, everything is submerged by the vapory flood. In the course of the evening, the wind falls. During the night, the mist is gradually dissolved, and disappears from the lower stratum of air, while it forms a heavy cloud above. About the middle of the forenoon, the cloud is dispersed by the rays of the sun. The dispersion is rapid, the sky often becoming entirely clear in less than half an hour.

"If it be possible to distinguish between fog and mist—regarding the former as impalpable, and the latter as composed of palpable particles of moisture—I may remark that mist belongs only to the summer, and fog to the winter climate of San Francisco. There is no mist in winter, and no fog in summer. At all seasons, the drying tendency of the atmosphere is observable. You notice none of those phenomena which, in other climates, depend on an excess of water in the air, and on sudden changes of temperature. The moisture does not condense on your windows, nor on the plastered walls; salt does not liquify, nor even exhibit the slightest dampness; and the housewife has no trouble in drying her clothes, provided it should not rain. In fact, the atmosphere of San Francisco, in spite of sea winds and mists, is a dry atmosphere."

§ 71. *January and July.*—The following table shows the mean temperature of January and July, and the difference between them in certain prominent points in California, and other countries and States.

PLACE.	JAN.	JULY.	DIFFERENCE.	LATITUDE.
	deg.	deg.	deg.	deg. min.
San Francisco	49	57	8	37 48
Monterey	52	58	6	36 36
Santa Barbara	54	71	17	34 24
Los Angeles	52	75	23	34 04
Jurupa	54	73	19	34 02
San Diego	51	72	21	32 41
San Luis Rey	52	70	18	33 15
Sacramento	45	73	28	38 34
Stockton	49	72	23	37 56
Humboldt Bay	40	58	18	40 44
Sonoma	45	66	21	38 18
St. Helena	42	77	35	38 30
Vallejo	48	67	19	38 05
Antioch	43	70	27	38 03
Millerton	47	90	43	37 00
Fort Jones	34	71	37	41 40
Fort Reading	44	82	38	40 28
Fort Yuma	56	92	36	32 43
Cincinnati	30	74	44	39 06
New York	31	77	42	40 37
New Orleans	55	82	27	29 57
Naples	46	76	30	40 52
Jerusalem	47	77	30	31 47
Honolulu	71	78	7	21 16
Mexico	52	65	13	19 26
Funchal	60	70	10	32 38
London	37	62	25	51 29
Dijon	33	70	37	47 25
Bordeaux	41	73	32	44 50
Mentone	40	73	33	43 41
Marseilles	43	75	32	43 17
Genoa	46	77	31	44 24
Algiers	52	75	23	36 47

The following table furnishes the figures for a comparison of temperature at various points on the Central Pacific Railroad across the State, from the level of the sea to the summit of the Sierra:

TOWNS.	JANUARY. deg.	JULY. deg.	DIFFERENCE. deg.	ELEVATION. feet.
San Francisco	49	57	8	30
Livermore	48	68	20	485
Sacramento	46	72	24	30
Auburn	45	75	30	1363
Alta	43	75	32	3612
Cisco	30	62	32	5939
Summit	27	60	33	7017
Truckee	23	53	30	5846

It will be observed that the winter becomes cooler regularly, as we ascend the Sierra, and also after we begin to descend on the eastern side, the January of Truckee being seven degrees colder than that of Cisco, at a higher elevation on the western slope. The heat of midsummer increases till we reach an elevation of 3,000 feet, and then begins to decline.

January and July are the two typical months, and from them we can form a good general idea of the temperature of a place.

We observe, in the above table, that the January of San Francisco is 4° warmer than that of Sacramento, 7° warmer than St. Helena, 18° warmer than New York, 12° warmer than London, and 3° warmer than Naples.

San Francisco's July, on the other hand, is 16° cooler than that of Sacramento, 14° cooler than that of Santa Barbara, 20° cooler than St. Helena, 33° cooler than Millerton, 20° cooler than New York, and 19° cooler than Naples.

The difference between the mean temperatures of January and July, is 9° greater at Santa Barbara, 20° greater at Sacramento, 27° greater at St. Helena, 35° greater at Millerton, 34° greater at New York, and 22° greater at Naples, than at San Francisco.

Honolulu is a fair sample of tropical climate on a small island, very equable, but 14° warmer, in its coldest month, than San Francisco is in July.

§ 72 *Monthly Means.*—The following table gives the mean monthly temperatures for a number of places in California and elsewhere.

PLACES.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	AVERAGE.
San Francisco	49	51	52	55	55	56	57	57	58	57	54	51	54
Vallejo	47	5	53	57	59	67	67	66	64	62	54	47	58
Sacramento	45	4	51	59	67	71	73	73	66	64	52	45	59
Millerton	47	53	56	62	68	83	90	83	76	67	55	48	66
Fort Reading	44	49	54	59	65	77	82	79	71	62	52	44	62
Fort Yuma	56	58	66	73	76	87	92	90	86	76	64	55	73
St. Helena	42	49	56	57	66	70	77	70	66	59	54	51	
Vacaville	43	53	55	62	66	72	74	73	72	66	60	43	52
Meadow Valley	34	37	41		61	66	71	68	57	52	44	36	
Fort Jones		37	43	49	51	61	71	68	62	51	41		[illegible]
Grass Valley	27	37	38	44	49	52	63	58	53	53	43	36	40
New York	31	30	38	47	57	67	73	72	66	55	45	34	51
New Orleans	55	58	64	70	75	81	82	82	78	70	62	55	69
Steilacoom	38	40	42	48	55	60	64	63	57	52	45	39	50
London	37	40	42	46	53	58	62	62	57	50	44	40	49
City of Mexico	52	54	61	63	66	65	65	64	64	60	55	52	60
Naples	46	47	51	56	64	70	76	76	69	61	53	49	60
Funchal	60	60	62	63	64	67	70	72	72	67	64	60	65
Honolulu	71	72	72	74	76	77	78	79	78	76	74	73	75
Jerusalem	47	53	60	54	66	71	77	72	72	60	58	47	62
Canton	52	55	62	70	77	81	83	82	80	73	65	57	69
Nagasaki	43	44	50	61	69	77	80	83	78	66	53	47	62

San Francisco has one of the mildest and most equable climates in the world. Many places in the tropics are more equable, but with the equability of intense and enervating heat. Vallejo is nearly thirty miles from the ocean, and has a warmer summer and a colder winter than the immediate coast. Sacramento has the climate of Naples and Jerusalem throughout the year: its summer being the same as that of New York, but its winter fourteen degrees warmer. Fort Reading and Nagasaki have nearly the same figures. Fort Yuma, in the Colorado Desert, in latitude 32° 45′, is warmer than New Orleans in 29° 57′.

The Pacific Railroad, running eastward from Oakland, a suburb of San Francisco, passing over the Sierra Nevada, the summit of which is reached in 274 miles, enables the traveler along its line to place himself in any comfortable degree of heat or cold, in ordinary summer days. He can find banks of snow near Cisco in July. Ten miles west of Oakland is the ocean-beach, where a chilling wind blows without ceasing. Going from the coast, the traveler would gradually get into a warmer clime, until, in Stockton, he would find the thermometer indicating 85°, most of the summer noons; and proceeding up the sides of the Sierra, he would gradually rise into greater cold, to the eternal frost on the summit. A branch road, running south to Fort Yuma, would enable the traveler to enjoy almost as great a variety of temperature in the winter.

§ 73. *Clear Days.*—On an average, there are two hundred and twenty perfectly clear days in a year, without a cloud, in the Sacramento Basin; eighty-five days wherein clouds are seen, though in many of them the sun is visible; and sixty, rainy. Italy cannot surpass that. New York has scarcely half so many perfectly clear days. From the first of April till the first of November there are, in ordinary seasons, fifteen cloudy days; and from the first of November till the first of April, half the days are clear. It often happens that weeks upon weeks in winter, and months upon months in summer, pass without a cloud. Near the ocean shore, coast-clouds or fogs are frequently blown up from the sea, but they disappear after ten o'clock in the morning.

§ 74. *Sirocco.*—Several cases are on record, of a sirocco, or burning-hot wind, visiting the coast. One was felt at the town of Santa Barbara, on the 17th of June, 1859. The *Gazette* newspaper of that place, published six days afterward, said:

"Friday, 17th June, will be long remembered by the inhabitants of Santa Barbara, from the burning, blasting heat experienced that day, and the effects thereof. Indeed, it is said that, for the space of thirty years, nothing in comparison has been felt in this country, and, we doubt, in any other. The sun rose like a ball of fire on that day; but though quite warm, no inconvenience was caused thereby until two o'clock P. M., when suddenly a blast of heated air swept through our streets, followed quickly by others; and shortly afterward the atmosphere became so intensely heated, that no human being could withstand its force: all sought their dwellings, and had to shut doors and windows, and remain for hours confined to their houses. The effect of such intense and unparalleled heat was demonstrated by the death of calves, rabbits, birds, etc. The trees were all blasted; and the fruit, such as pears and apples, literally roasted on the trees ere they fell to the ground, and the same as if they had been cast on live coals. But, strange to say, they were only burned on one side, the direction whence came the wind. All kinds of metal became so heated, that for hours nothing of the kind could be touched with the naked hands. The thermometer rose to nearly fever-heat—in the shade. Near an open door, and during the prevalence of this properly-called sirocco, the streets were filled with impenetrable clouds of fine dust, or pulverized clay. Speculation has been rife since to ascertain the cause of such a terrible phenomenon; but, though we have heard of many plausible theories thereon, we have not been fully convinced yet; however that might be, we see its terrible effects all around us, in blighted trees, ruined gardens, blasted fruit, and almost a general destruction of the vegetable kingdom here."

A correspondent of a San Francisco paper wrote thus: "At one o'clock in the afternoon of the 17th instant, a burning wind came upon us from the northwest, and smote us with terror. At two o'clock, the thermometer exposed to this wind rose to 133° of Fahrenheit; at five o'clock, it had fallen to 122°; and at seven o'clock, it stood at 77°, where it had been in the morning. During the whole time of this visitation, every one stayed in the house, taking good care to keep doors and windows closed. A fisherman who was out at sea, came back with his arms all blistered. Many calves, rabbits, and birds, died of suffocation. The greatest losses are among the vegetables. The fruit-trees are all burned; the pears and apples have been literally cooked."

A similar occurrence of a hot wind, six days later, in Stanislaus County, was thus described by a correspondent of the Stockton *Argus:*

"The thermometer was 113° in the shade. The wind was avoided, as it was heated so, that it felt as if actually burning the flesh—as if rushing from a hot oven. In one team of ten horses, three fell in the road, from heat; two died, but the other recovered by pouring sweet oil in its throat. The animal's throat was closed, so that it could not drink, when the oil was used so as to soften the throat, and open it, that it could swallow water, when it recovered. The two that died, expired before such aid could be used with them. At Burton's public house, at Loving's Ferry, birds flew into the bar-room, to the pitcher, to get water, so tame were they made by the thirst caused by extreme heat. Birds were seen to fall dead off the limbs of trees, in the middle of the day, from the heat, as if they were shot. The wind was of that burning heat, never before witnessed by the settlers there since their arrival in the State."

§ 75. *Interior Basins.*—The climate of the Sacramento-San Joaquin Basin differs from that of San Francisco in having no fogs, faint sea-breezes, winters four degrees colder, and summers from sixteen to twenty degrees warmer. The greater heat of summer is owing to the want of ocean winds and fogs; the greater cold of winter is caused by the distance from the Pacific, and the proximity of the snow-covered Sierra Nevada. While, at San Francisco, the thermometer usually stands at 70° at mid-day, it is at 86° in Sacramento city at the same moment; and these sixteen degrees make a vast difference, for they change comfort into oppression. And Sacramento city, lying near the great gap in the Coast Mountains, is cooler in summer than either end of the basin; for the upper portions of both the Sacramento and San Joaquin Valleys, nearly every summer, see days when the thermometer stands at over 100° in the shade. The County Assessor of Fresno County stated, in his annual report for 1857, that the mean temperature at Millerton, during the three summer months, was 106°.

In the Sierra Nevada, the heat of the summer at mid-day is about the same as in the Sacramento Valley; but the winter is cold, and the amount of rain greater in proportion to the altitude above the sea. In places three thousand feet above the ocean-level, ice forms five and six inches thick, and snow, deep enough for sleighing, lies several weeks nearly every winter. In towns six thousand feet above the sea, the snow falls from five to ten feet deep, and covers the ground four or five months in the year.

In the Enclosed Basin, the winters are cold and the summer days very hot; but there too the nights are always cool.

The Colorado Desert has exceedingly hot summer days and warm winters, but occasional frosts in the spring and fall, as well as in the winter.

In the Klamath Basin, the winters are very cold, and frosts occur nearly every month in the year.

§ 76. *Rain.*—Nearly all the rain in California falls between the first of November and the first of June—the period called the "rainy season," as contradistinguished from the "dry season," which occupies the remainder of the year. Those names, however, when applied to any special season, do not signify an unchangeable set of months, but rather the term during which the rain falls or the dry weather lasts. Thus, we say that the rainy season of 1858–59 began in October, because in that month the first heavy rains fell; the rainy season of 1870–71 did not begin until December; the dry season of 1865 began in March; that of 1860 not till June; and so forth. The rainy season is so called, not because the rain falls then continuously, but because it does not fall at any other time. There are occasional showers in June, July, August, and September, but they are rare and light.

The following table gives the average amount of rain, in inches, which falls during the four seasons of spring, summer, autumn, and winter, at various places in California, as compared with the amount in certain other places.

PLACES.	SPRING.	SUMMER.	AUTUMN.	WINTER.	YEAR.
San Francisco.......	6.64	0.13	3.31	13.33	23.41
Sacramento.........	7.01	0.00	2.61	12.11	21.73
Fort Reading.......	11.30	0.39	4.89	12.44	29.02
Fort Humboldt......	13.51	1.18	4.87	15.03	34.56
Fort Miller.........	9.57	0.02	2.80	9.79	22.18
Fort Yuma.........	0.27	1.30	0.86	0.72	3.15
San Diego..	2.74	0.55	1.24	5.90	10.43
Astoria	16.43	4.00	21.77	44.15	86.35
Portland, Maine.....	12.11	10.28	11.93	10.93	45.25
New York City......	11.69	11.64	9.93	10.39	43.65
New Orleans........	11.29	17.28	9.62	12.71	50.90
St. Louis...........	12.86	14.09	8.71	6.29	41.95
Rome	7.27	3.39	10.89	9.31	30.86
Paris..............	5.53	5.92	6.51	4.68	22.64
Liverpool..........	6.19	9.78	10.81	7.32	34.10

From this table it appears that the amount of rain is about one-half as great in San Francisco as in those States east of the Mississippi. Here all the rain falls in the winter and spring; there the amounts are nearly the same in the four seasons. They have as much rain in their summer and autumn as we in our winter and spring. We have less rain than Liverpool and Rome, and about the same amount as Paris.

§ 77. *Railroad Rain Table.*—The following table gives the rainfall at various points on the line of the Pacific Railroad, crossing the State near its middle from west to east, with the elevations in feet and the distances by rail in miles from San Francisco.

PLACE.	1870-71.	1872-73.	DISTANCE.	ELEVATION.
San Francisco	12.50	10.	0	15
Oakland	11.60		6	15
Niles	7.30		29	87
Livermore	5.90		47	485
Ellis	3.80		69	76
Stockton	4.75	12.5	91	23
Sacramento	7.85	13.5	138	30
Rocklin	10.00		160	249
Auburn	17.45	25.	174	1363
Colfax	30.90	33.	192	2421
Alta	27.95		206	3612
Cisco	32.95	52.	230	5939
Summit	34.45		243	7017
Truckee	17.00	25.	257	5846
Boca	10.50	9.	264	5533
Reno	2.30		292	4507

The amount of the rainfall increases at the rate of about an inch for one hundred feet of elevation as we ascend the Sierra Nevada from the west, and decreases still more rapidly as we descend on the other side. Reno, fifty miles from the summit, is in the State of Nevada, but its figures indicate the rainfall of many places in California, at an equal distance from the summit on the same side.

The average annual rainfall is about 34 inches at Crescent City, 32 at Humboldt Bay, 23 at San Francisco, 18 at Monterey, 14 at Santa Barbara, 12 at Los Angeles, and 10 at San Diego, making a difference of 24 inches in a distance of less than ten degrees, or a little more than two inches to the degree.

§ 78. *State Rains for twenty-three years.*—The following table shows the annual rainfall as recorded at San Francisco and Sacramento since 1849, and at Stockton, Los Angeles, Santa Barbara, Nevada, and Napa, for a few years. The observations at San Francisco are by different observers, the figures given by Dr. Gibbons being generally less than those by Mr. Tennent. The difference in one year was nine inches. Both are careful and conscientious observers, but there is probably a difference in the situations of their gauges.

YEAR.	SAN FRANCISCO.		Sacramento.	Stockton.	Los Angeles.	Santa Barbara.	Nevada.	Napa.
	Tennent.	Gibbons.						
1849–50	33		36					
1850–51	7	7	4					
1851–52	18	18	17					
1852–53	35	33	36					
1853–54	23	23	20	21				
1854–55	23	24	18	11				
1855–56	21	21	13	8				
1856–57	19	20	10					
1857–58	21	19	18					
1858–59	22	20	16					
1859–60	22	17	22					
1860–61	19	15	15		7			
1861–62	49	38	35		13			
1862–63	13	15	11		4		27	
1863–64	10	8	7		4		17	
1864–65	24	21	22		10		54	
1865–66	22	21	17		15		59	
1866–67	34	32	25		17		81	26
1867–68	38	40	32	20	11	25	115	30
1868–69	21	21	16	16	10	15	56	19
1869–70	19	20	13	8	4	10	53	15
1870–71	14	13	8	6	7	8	45	10
1871–72	34	33	24	8	13	14	70	30
1872–73	17							

The observations for San Francisco in the first column were taken by Thomas Tennent, and in the second by Dr. Henry Gibbons; those for Sacramento, by Dr. Thomas Logan; for Stockton, by Dr. G. Shurtleff; for Napa, by W. A. Trubody; for Santa Barbara, by Dr. J. B. Shaw.

The rainfall at Shasta in 1871–72, was 96 inches; at Murphys, in 1870–71, 17 inches; at San Luis Obispo, 11.83 inches in 1869–70, and 12.97 inches in 1870–71; at Modesto, in 1870–71, 2.25 inches; at Chowchilla, in 1870–71, 5 inches;

at Marysville, in 1870–71, 6.60 inches; at Chico, in 1870–71, 17.60 inches; at Sesma, in 1870–71, 13.13 inches; at Placerville, in 1861–62, 86, and in 1862–63, 26 inches; at South Yuba Reservoir, in 1861–62, 109 inches; and at Hoopa Valley, in 1861–62, 129 inches.

§ 79. *Monthly Table*, 1849–1873. The following table of the rain, month by month, from July, 1849, to June, 1873, is derived from the observations kept by Thomas Tennent:

	1849.		1850.		1851.		1852.		1853.		1854.		1855.		1856.	
	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.	Quantity.	Days.
July															.02	1
August									.04	1	.01	1				
September..			.33	4	1.03	1			.46	4	.15	3			.07	2
October	3.14	3			.21	2	.80	1	.12	2	2.41	9			.45	5
November..	8.66	8	.92	7	2.12	5	5.31	12	2.28	12	.34	2	.67	7	2.79	9
December ..	6.20	12	1.05	4	7.10	14	13.20	20	2.32	11	.81	3	5.76	15	3.75	12
	1850.		1851.		1852.		1853.		1854.		1855		1856.		1857.	
January....	8.34	15	.72	5	.58	4	3.92	11	3.88	10	3.67	11	9.40	13	2.45	7
February...	1.77	5	.54	4	.11	4	1.42	5	8.04	16	4.77	10	.50	4	8.59	15
March......	4.53	7	1.94	9	6.68	14	4.86	6	3.51	11	4.64	12	1.69	5	1.62	6
April.......	.46	3	1.23	8	.26	3	5.37	8	3.12	9	5.00	10	2.94	6		
May........			.67	3	.32	1	.38	7	.02	1	1.88	6	.76	3	.02	3
June									.68	2			.03	1	.12	1
	33.10	53	7.40	39	18.44	48	35.26	70	23.87	79	23.68	67	21.66	51	19.81	61
	1857.		1858.		1859.		1860.		1861.		1862		1863.		1864.	
July			.05	2			.21	1								
August	.05	2	.16	2	.02	1									.21	3
September..					.03	1			.02	1			.05	1	.01	1
October	.93	3	2.74	4	.65	1	.91	12			.40	2			.13	3
November...	3.01	11	.69	5	7.28	15	.58	3	4.10	12	.15	3	2.55	5	6.68	8
December ...	4.14	8	6.14	14	1.57	6	6.16	21	9.54	16	2.35	9	1.80	8	8.91	18
	1858.		1859.		1860.		1861.		1862.		1863		1864.		1865.	
January	4.36	8	1.28	4	1.64	8	2.47	8	24.37	18	3.63	9	1.83	5	5.14	9
February...	1.83	8	6.32	18	1.60	7	3.72	8	7.55	10	3.19	10			1.34	8
March	5.55	8	3.02	11	3.99	13	4.08	8	2.20	11	2.06	8	1.52	9	.74	4
April.......	1.55	4	.27	4	3.14	8	.51	4	.73	9	1.61	9	1.57	4	.94	3
May........	.34	3	1.55	4	2.86	11	1.00	3	.74	5	.23	2	.78	5	.63	2
June	.05	1			.09	2	.08	2	.05	1						
	21.88	56	22.22	68	22.27	73	19.72	70	49.27	83	13.62	52	10.08	37	24.73	59
	1865.		1866		1867.		1868.		1869.		1870.		1871.		1872.	
July																
August																
September..	.24	2	.11	2	.04	1			.12	1	.03	1	.03	2	.14	1
October.....	.26	4			.20	1	.15	3	1.29	2			.11	2	.21	1
November..	4.19	10	3.35	12	3.41	6	1.18	5	1.19	5	.43	4	3.72	9	2.62	3
December ..	.58	8	15.16	18	10.69	18	4.34	11	4.31	7	3.38	8	16.74	14	7.25	10
	1866.		1867.		1868.		1869.		1870.		1871.		1872.		1873.	
January....	10.88	16	5.16	15	9.50	17	6.35	14	3.89	9	3.07	7	4.22	9	2.17	8
February...	2.12	9	7.20	9	6.13	9	3.90	5	4.78	9	3.76	10	6.97	18	4.24	17
March... ..	3.04	12	1.58	7	6.30	12	3.14	12	2.00	8	1.29	8	1.64	9	.78	4
April.......	.12	1	2.36	8	2.31	9	2.19	5	1.53	4	1.93	5	1.10	6	.44	
May........	1.46	6			.03	2	.08	2	.20	2	.21	3	.16	2		
June........	.04	1			.23	3	.02	1					.02	2		
	22.93	69	34.92	71	38.84	78	21.35	58	19.31	47	14.10	46	34.71	73	18.02	

Mr. Tennent is a careful observer, but I think the figures for January, 1862, must be erroneous, due perhaps, to some exceptional influences near his rain gauge; and I fancy the general fall in the city was not more than fifteen inches in that month. Dr. Gibbons reports 38 inches for the seasons 1861 and 1862, or eleven inches less than Mr. Tennent, and I am more disposed to accept the smaller figures.

The subjoined table is compiled from Mr. Tennent's record:

MONTH.	INCHES RAINFALL.			COMPARISON OF MONTHS					RAINY DAYS.			
	Average.	Highest.	Lowest.	No rain.	Under average.	Over average.	Fifty per ct. under.	Total extremes.	Total number.	Annual average.	Greatest number.	Under average.
Column ...	1	2	3	4	5	6	7	8	9	10	11	12
July..........	0.01	0.21	0.00	21	21	3	21	24	3	0.1	2	21
August........	0.02	0.21	0.00	18	19	4	18	22	10	0.4	3	18
September	0.20	1.03	0.00	8	20	1	16	17	28	1.1	4	16
October.......	0.58	3.14	0.00	6	17	6	15	21	60	2.5	12	15
November....	2.87	8.66	0.15	0	19	4	9	13	182	7.5	15	13
December.....	6.29	16.74	0.58	0	19	5	7	12	285	11.8	21	11
January.......	5.10	24.36	0.58	0	16	5	7	12	240	10.0	18	14
February	3.80	8.59	0.00	1	13	7	9	16	218	9.0	18	11
March.........	3.08	6.68	0.74	0	14	5	4	9	214	8.9	14	14
April..........	1.69	5.37	0.00	1	15	5	8	13	130	5.4	10	13
May	0.59	2.86	0.00	3	14	5	11	16	81	3.3	11	18
June..........	0.05	0.12	0.00	13	18	5	13	18	17	0.7	3	13

The first column shows the annual rainfall of each month for the last twenty years.

The second column shows the greatest, and the third the smallest, amount that has fallen in the month in any year since 1849.

The fourth shows the number of years out of twenty-four, in which the month has brought no rain.

The fifth shows the number of years in which the month has brought less than the average, which is brought up by large figures at intervals. The purpose of this and the next three columns, is to show the irregularity of the seasons.

The sixth column shows the number of years in which the several months brought fifty per cent., or more than the average. The average of December is 6.29 inches; an addition of fifty per cent. to that makes 9.44. We find that in five out of the twenty-four years, December gives fifty per cent. more than the average, and the next season shows that in seven seasons it brought at least fifty per cent less than the average, or less than 3.15 inches.

The eighth column shows the number of seasons in which the several months have brought either fifty per cent. more or fifty per cent. less than the average, and as either is an extreme, I find that most of the seasons are extreme in their character.

The ninth column shows the total number of rainy days in twenty-four seasons, from July 1st, 1849, to June 30th, 1873.

The tenth column shows the average, and the eleventh the greatest number of rainy days in each month.

The twelfth shows the number of months in twenty-four years in which the number of rainy days has been under the average.

§ 80. *Drought and Flood.*—Floods usually come with more than thirty inches of rain, and droughts with less than sixteen at Sacramento, the damage being dependent, to a certain extent, upon the distribution, as well as upon the amount, of the rain. Thus, in a very wet season, if the moisture comes in nearly equal quantities in each one of the sixteen or twenty weeks, the streams do not rise so high as if ten or fifteen inches came in one month. The flood seasons have been 1849-50, 1852-53, 1861-62, and 1867-68, or four in twenty-five years.

The years of drought have been 1851, 1856, 1857, 1861, 1863, 1864, 1870, and 1871, or eight in twenty-five years. There are two droughts to one flood, and every other year, on an average, brings either a drought or a flood.

§ 81. *Dryness of Air.*—The small amount of rain during the winter, the entire want of it during the summer, the warmth of the sun, and the great number of cloudless days, render the climate a very dry one. As one consequence or accompaniment of our dry climate and clear sky, it may be worth while to observe that near the ocean the clouds are rarely picturesque or sublimely beautiful. The magnificent sunsets, where the god of light goes down amid curtains of gold and crimson—those high-piled banks of clouds which adorn the heavens before and after thunder-showers, in the Mississippi Valley—are rarely seen near the coast.

Dew is rare or slight over a great part of the State. During the summer and autumn, many of the rivers sink in the sand soon after leaving the mountains in which they rise; the earth is dry, and baked hard to a depth of many inches or even feet; the grass and herbage, except near springs or on swampy land, are dried up, and as brown as the soil on which they grew.

It has been said that very hot days are less oppressive in California than equal heat in the Eastern States, because the cool nights serve to invigorate the system, and the extreme dryness of the climate favors the evaporation of sweat, and thus keeps the body cooler than in districts where the earth is always moist. Evaporation is so rapid that a beefsteak hung up in the air will dry before it can commence to putrefy. A dead rat thrown into the street, where its body is crushed by wagon-wheels so that its viscera are exposed to the air, will "dry up," and its stiff hide and meat will lie during a whole summer in a mummy-like condition. In many places, steel may be exposed to the night air for weeks without getting a touch of rust.

It is common to ascribe the effects of the dryness of the atmosphere to the "purity" of the air; but it is rather the absence of moisture. I know no reason for supposing that, apart from its dryness, the air in California is purer than in any other part of the continent. It may be, however, that the constant decomposition of animal and vegetable matter lying on wet ground, under a hot sun, causes the air in other States to be filled with such gases as are not set free to an equal extent here.

In May and June all California "dries up"—the rivers, the brooks, the springs, the ditches, the vegetation—and with them many of the resources of the country.

§ 82. *Length of Days.*—The shortest day in the year, the 20th of December, measures nine hours and four minutes between sunrise and sunset at Crescent City, and ten hours at San Diego; while the longest day, the 20th of June, measures fifteen hours and seventeen minutes on the southern border, and fourteen hours and nineteen minutes on the northern border of the State—or, measuring from the beginning of twilight in the morning to the end of twilight at night, the day measures nineteen hours and forty-seven minutes on the Siskiyou Mountains, and seventeen hours and forty-three minutes at Fort Yuma.

§ 83. *Thunder-Storms.*—Thunder-storms are very rare in California. Lightning is not seen more than three or four times a year at San Francisco, and then it is never near. Thunder is still more rare. Indeed, many persons have been here for years, without observing either. I have never seen a brilliant flash of lightning, and have heard but one loud clap of thunder in the State. Thunder-storms are sometimes witnessed high up in the mountains, and in the great Basin; very rarely in any of the low land of the State. In May, 1860, a house in Sonora was struck by lightning; and in February, 1861, three vessels in Humboldt Bay were struck in the same manner: and, though there were persons in the house and on all the vessels, no serious injury was done to either person or property in any case. On the 25th of May, 1860, a Chinaman was killed by lightning near the Lexington House, on the Coloma road, in Sacramento County; and that is, I think, the only death by electricity in California on record.

The weather never has that peculiar condition which isolates everybody electrically, and then fills them with electricity. In New York, on a dry winter evening, a man dressed in woolen and shod in woolen slippers, after sliding along on the carpet a few steps, will accumulate so much electricity, that when he thrusts his finger at another person, a visible spark will fly off, and he can light gas with it! But this amusing experiment, not uncommon in the Eastern States, never has been successful here.

§ 84. *Hail.*—Hail is a rarity; and instead of falling in July and August, as is usual in the Eastern States and Europe, it is seen in California only between February and May. On the 10th of May, 1856, a storm of hail-stones, some of them weighing twelve pounds each, visited a small district at Butte Creek, in Shasta County. It has several times happened that hail-stones more than an inch in diameter have fallen in the Sacramento Valley.

The *Aurora Borealis* is seldom seen in California, perhaps not more than a dozen times within the last twenty years. The aurora of the 28th of August, 1859, seen over a great part of the world, was plainly visible in this State.

§ 85. *Sand-Storms.*—In the Colorado Desert, and in some other districts in the southern part of the State, sand-storms, similar to the simoons of Africa, but not so dangerous, occasionally occur. The sand, which forms the greater portion of the soil, unprotected by sod, vegetation, or moisture, is swept away in dense clouds by every high wind, and carried many miles, a terror to man and beast. The storm stops the traveler, because he dare not open his eyes to the little flinty particles; nor can he eat, for the dust covers his food and fills his mouth; and even in the most tightly-built houses the sand penetrates and fills the air.

A newspaper correspondent speaks thus of a Colorado sand-storm:

"Should the traveler happen to encounter a sand-storm, however, he may not get along so smoothly. A huge, black cloud, rising from the western horizon, warns him of its approach. Rapidly it spreads over the sky, darkens the sun, and the fine particles of sand are swept before the gale in a dense and suffocating cloud; even the larger gravel and pebbles are sometimes lifted from the plain and carried like hail before the force of the blast. The horses are blinded, paralyzed with fear, and no urging can induce them to go forward. Were it otherwise, to go on would be folly; the road and sun are hid from view; no landmarks by which to be guided—safety bids you remain. The traces are unhitched, and the horses tethered to the wagon; the only course is to securely fasten down the sides to the wagon-top, and wait with what patience one can command until the storm has passed, which will be, doubtless, in from six to ten hours.

"Once the stage encountered a sand-storm, while within three hundred yards of a station; the horses could not be induced to move, and there was no remedy but to stay by them till the gale had spent its force, though the station was even in sight.

"I have found such a storm sufficiently disagreeable while housed by the river-side, the fine sand penetrating everywhere, and have no ambition to encounter one upon the central desert. Luckily, they are not very common in the severest aspect; in summer, quite rare."

CHAPTER IV.

SALUBRITY.

§ 86. *Healthy Growth.*—In the preceding chapter, proof was furnished that the climate of the coast of California is more equable, and more favorable to human growth and comfort, than that of Italy, Greece, or Palestine, countries which have had the repute from remote times, of having the most auspicious skies in the old world. In the chapter on agriculture and botany, we shall see that the domestic animals and cultivated plants grow with a rapidity, and the fruit trees, cereals, and kitchen vegetables, bear with a fecundity, unsurpassed and probably unequaled in any other part of the world. In my researches I have not been able to learn of crops elsewhere so large as many recorded in California.

The Spanish Californians, before the American conquest, had remarkably large families, and were long-lived beyond example. In no place known to me were there so many centenarians relatively. Prominent among the early settlers were Ignacio Vallejo, Joaquin Carrillo, José Noriega, José Argüello, José Maria Pico, Francisco Sepulveda, José Maria Ortega, and Juan Bandini. These men had eleven children each on an average, the largest number in one family being thirteen and the smallest nine. Two children of Ignacio Vallejo had each a dozen, and one grandchild has had a dozen children. José Antonio Castro had twenty-five. It was a common event for persons to have several hundred living descendants. Juana Cota had five hundred, and Señora Dominguez, who planted the big vine at Montecito, in Santa Barbara County, had three hundred. Such cases may be found in every country, but in no such large proportion elsewhere. The records of the Mission and parish church of Santa Barbara, from 1782 till 1847, a period of 65 years, show that, in that period, the births were 1,781, the deaths 441, and the marriages 298. These figures indicate six births on an average to one marriage, a ratio not to be equaled elsewhere.

Our later statistics are defective. The majority of the population are not natives of the country, and many invalids have come from the Atlantic side, so that the State may be regarded as a sanitarium, and on that account it has more deaths than properly belong to it.

According to the Federal census report, the number of deaths in the year ending June 1st, 1870, was 9,025 or 16 per thousand; a number which is moderate in itself, yet is above the average for the whole Union, which has only 12. The only States above California are Louisiana, 20, Massachusetts, 17, and Missouri, 16. The average mortality among civilized nations ranges from 20 to 40 per thousand, and we may safely assume that the report that eighteen States have less than 12 deaths to the thousand annually, is grossly erroneous. The Health Report of New York City gives the following figures of the deaths per thousand in certain prominent cities of Europe and the United States.

Naples	39	Vicksburg	41
Berlin	38	Troy	38
Milan	38	Mobile	34
Florence	37	Charleston	31
Vienna	35	Savannah	30
Liverpool	35	New Orleans	29
Turin	33	New York	28
Glasgow	32	Baltimore	26
Manchester	31	Boston	23
Rome	30	Chicago	23
Genoa	29	Philadelphia	22
Edinburgh	26	San Francisco	21
Dublin	26	Cleveland	19
London	24	St. Louis	16

The advantages of our climate for salubrity consist mainly in the dryness of the atmosphere, and the equability and mildness of the temperature. Moisture combined with heat causes fevers and pneumonia; combined with cold it brings on consumption. Malarial diseases and affections of the respiratory organs, together, carry off a large part of our race, and nowhere can the percentage of loss by them be brought to a lower figure than in this State. In Massachusetts, 29 out of 100 deaths are caused by diseases of the respiratory organs; in Maine 27, in London 26, in Cuba 25, and in California 30; but of these, few caught the disease in this State. All the authorities agree, that conditions like those here prevalent are the best for the prevention and cure of consumption. Blodgett, in his work on climatology, expressed the opinion that not more than four per cent. of the natives of California will die of consumption; and although he wrote nearly twenty years ago, nothing has since occurred to show that he was wrong.

§ 87. *Infant Mortality.*—An article published in the St Paul's *Medical Journal*, in 1872, says, that of 365,508 deaths reported by the Board of Health of New York city, from 1804 to 1853, 184,534, or more than 50 per cent., were children under five years of age. The same percentage is observed in the deaths of the same city in 1866, 1867, and 1869; in Chicago, from 1843 to 1869, the proportion was 51 per cent.; in Philadelphia, from 1858 to 1870, 45 per cent.; and in Baltimore, in 1860, 1861, 1862, 1865, and 1866, 47 per cent. Some of this mortality is to be charged, undoubtedly, to constitutional weakness, inherited from weak, diseased, dissipated, ill-fed, or unhappy parents; but far more is due to bad food, insufficient care, defective ventilation, scanty clothing, and exposure to wet and cold. The poor farmer who should lose half his sheep, pigs, or calves, under ordinary circumstances, would be regarded as grossly ignorant, or careless; but the rich inhabitants of the cities generally lose about half their children by death before maturity.

According to the mortality statistics of the Federal Census, 492,263 deaths occurred in the United States, in the year ending June 1st, 1870, and of those 203,213, or 40 per cent., were infants (under five years old). According to the same authority, the total deaths, and the infants' deaths, in California in the same period, were 9,025 and 3,450 respectively, giving a ratio of 37 per cent. These figures are less favorable to California than those given in the report of the State Board of Health, according to which, in twenty-two places—including San Francisco, Sacramento, San José, Oakland, Marysville, Stockton, Petaluma, Los Angeles, Napa, and nearly all the larger towns of California—the total number of deaths in the year ending June 30th, 1871, was 4,831, and of these 1,614 were children under five years of age, or thirty-three per cent.; while in San Francisco alone, the proportion was thirty-four per cent. This implies that, of ten children who die in Eastern cities, three might be saved by keeping them in San Francisco for their first four summers. After they reach the age of five, the danger rapidly decreases for twenty years. The number of those who die in any one year under five, exceeds that of those who die between the ages of five and thirty.

The writer of the article above referred to, says:

" A great part of this mortality, which I believe to be avoidable, occurs in what is known as the 'heated term,' (a period of special dread to parents with young children) comprising the months of June, July, August, and September. Whenever the thermometer rises and remains for any considerable length of time above 80 degrees, derangements of digestion among infants living in such an atmosphere are very liable to occur. Milk, and all animal substances used for food, rapidly deteriorate in quality in regions of high temperature, and, unless great care is taken, become unfit diet for infants. The infantile stomach is particularly susceptible, and the child, by its suffering, will speedily show the bad effects of the least departure from pure, fresh, and wholesome food or water. Persistence in the use of food that has caused disordered digestion is shown to develop cholera infantum, or some other grave form of disease. High temperature is everywhere recognized as one of the chief provoking causes of diseases of the stomach and bowels, particularly among children under two years of age, whether nursed at the breast or artificially fed. These diseases in their inception are frequently mere disturbances of digestion caused by heat, or the deterioration of food, or the unwholesomeness of diet. According to the weekly mortuary reports of our cities, the diseases of this class alone are referred to as the cause of over twenty-five per cent. of all deaths occurring during the summer months; and the mortality among children under five years alone increases the death rate in cities from one-fourth to one-half over the other months of the year. As heat seems to be the constant attendant, if not the chief cause, of the 'summer complaints' of children, and consequent great mortality among them, it is obviously an element to be taken into special account, and, therefore, desirable to provide for those who are actually sick, quiet apartments or homes, where they can have free ventilation and pure air of a moderate temperature."

The time will probably come when a large number of infants will be sent to spend their early years away from the hot and malarious districts where their parents are compelled by imperious business to live; and no better place than the Coast district of California can be found for the rearing of children. A large part of the mortality of infants in the Eastern States is caused by scarlet fever and cholera infantum. These two diseases carried off respectively 5,645, or ten per cent., and 2,683, or four per cent., out of a total of 52,659 in Pennsylvania, and 479, or five per cent., and 227, or two and a half per cent., in California, in the mortality year of 1869–70. In Pennsylvania fourteen per cent., and in California only seven and a half per cent. of all deaths, are chargeable to those two scourges. Pennsylvania was selected for comparison because it is central, and, as compared with the other portions of the Atlantic side, a salubrious State; yet the chances of death from those two main diseases are twice as great there as here.

§ 88. *Malaria.*—Climatic influence is the chief cause of sickness, and more men die of those diseases which may be classed as climatic, than of all other diseases combined. The climatic ailments are mainly fevers, which carry off from one-fourth to two-thirds of the human race; and inflammations of the respiratory organs, which carry off from one-sixth to one-third, according to circumstances. The precise manner in which the organs of the human system are thrown into disorder by meteorological influences is a matter of doubt and dispute; but the fungoid theory of disease is now gaining favor—the theory that many of our ailments are caused by the growth of vegetable parasites carried into our systems in the form of germs so minute that they float about in the air. These germs of disease multiply with the greatest rapidity, and display the most malignant activity, in a humid and hot atmosphere.

The principle is universally accepted among physicians, that malignant fevers owe their origin mainly to heat and humidity. We have overwhelming evidence that these two conditions always accompany, or have accompanied, the most fatal epidemics and endemics, including cholera, yellow fever, vomito, jungle fever, Panama fever, and various forms of plague which formerly raged in Europe, but seem to have entirely disappeared now. The greatest mortality by such ailments is invariably in hot climates, where the rainfall is great, or in warm, wet seasons; and they are never very destructive in high latitudes or altitudes, or in dry countries. In some tropical districts, forty per cent. of all foreigners are seriously sick the first year of their residence, and half of the cases prove fatal; and even the natives, accustomed to the climate, cannot venture to spend a night in certain unhealthy localities. The migration of business men to and from certain tropical cities, is almost as regular in spring and fall as the movements of migratory birds. Experience has proved that men who can safely spend the winter in New Orleans cannot stay there through one summer, without incurring greater danger than soldiers usually do in a severe pitched battle. The presence of malarial diseases is generally proportioned to the amount of rain, but in certain localities it depends on proximity to swamps, and the direction of the winds. Thus, if the winds blow regularly through the summer in a certain district from the westward, a town on low ground east of a large swamp, in a hot summer, will be sickly, while another town on the other side of the swamp may be quite healthy. Let the wind shift for a few weeks, and the conditions will change. If a high ridge runs through the sickly town, the people there will be healthier than on the low land. A French army that encamped on a malarial piece of ground, near Naples, was suddenly reduced, by sickness, from 28,000 to 4,000 men. In 1809, a British army corps lost 10,000 men at Walcheren, Netherlands, by malarial disease. It is highly dangerous to spend a single night in the open air in portions of the Campagna, near Rome. There are some very sickly places on the Sacramento basin, to the leeward of the tule swamps of ground flooded by water from ditches; and the introduction of extensive irrigation will injure the salubrity of some districts now free from malaria. Yet irrigation will not do more harm in the Sacramento-San Joaquin Valley than it does in Lombardy, which is inhabited by a handsome, active, and healthy race.

§ 89. *Consumption.*—Consumption is, in most cases, the growth of a cold, humid climate. In Massachusetts, from 20 to 25 per cent. of the deaths are by consumption; in Philadelphia, 12 per cent. Boston has more consumption, in proportion to its population, than any other place in the Union. It is more common among those classes confined to the house than those who work in the open air, the deaths by consumption, in some occupations, rising to 33 per cent. of the entire mortality. The Indians at Puget Sound also suffer much from consumption, probably because they spend a great portion of their time in huts filled with smoke.

At Philadelphia, 12 per cent. of the deaths are caused by consumption, 4 by pneumonia, 2 by croup, and 2 by bronchitis; but generally, in the Northern States, there are two cases of consumption to one of pneumonia. The proportion of the two diseases is reversed in the cotton districts, pneumonia appearing to replace consumption in the warm climates. The deaths by all diseases of the respiratory organs are 29 per cent. of the entire mortality in Massachusetts, 27 in Maine, 26 in London, 25 in Havana, 24 in Michigan, and 20 in New York. In California, most of our consumptives are imported. The dryness and warmth of our climate offer little encouragement for it, and the proportion of deaths from it is less than one-half that in New York.

A mild, dry climate is not only a protection against consumption, but also a cure for it. Dr. Copeland says: "Moisture is a good conductor of electricity; dry air, a bad one. The human body receives electricity constantly from the earth, with which it is in contact, and probably develops it through the organic processes. In dry weather, this electricity is retained, in a great measure, and the body becomes loaded with it, the nervous system is stimulated, and buoyancy and cheerfulness of mind follow. In damp weather, on the contrary, the moisture of the atmosphere acts as a conductor, and constantly carries away the electricity from the body; thence it is at a minimum, and mental depression follows."

Whether this explanation be correct or not, it is certain that a warm, moist climate impairs the appetite and causes languor, and a dry, cool atmosphere stimulates the appetite and invigorates the system. As debility is the main difficulty in consumption, it is evident that the warm, moist climate should be carefully avoided.

Persons suffering with debility, as well as consumption, should seek a climate marked by dryness, equability, and mildness. The nearest approach to such a climate in Europe is found on the shores of the Mediterranean, at Mentone, Nice, and Cannes, between Marseilles and Genoa, and consequently the best districts there are filled with invalids from other parts of the continent. The southern part of this State has a still better climate, more equable, drier, and milder. The injurious influence of moist air upon diseases of the throat and lungs has not been explained, but it is felt very plainly. The equability and mildness of temperature stimulate to exertion, and protect the invalid from dangerous chills and enervating heat, and take away any motive for cutting off ventilation.

It is only of late years that much attention has been given to medical climatology, and there is, as yet, no comprehensive treatise upon it. The books which treat of it omit to mention many material facts, and are devoted to the praise of small districts. For the cure of diseases of the respiratory organs, no part of the continent is equal to California. Our climate has the equable, mild, and dry character that is needed by persons suffering with bronchitis and various forms of pneumonia. It is now conceded by leading physicians that consumption, except in very advanced stages of the disease, is curable, not by drugs, which are injurious, but by living in the open air, especially in a dry atmosphere. The disease is mainly caused by breathing foul air, and is most destructive to persons dwelling in close rooms. The only cures of advanced cases of consumption, well authenticated, within the range of our experience and study, were effected by the influence of the open air.

The mildness of climate is important to invalids generally. Perfect ventilation and exercise are necessary in many diseases, and they will always be neglected if they are not conducive to comfort, as they are here. Cold prevents ventilation, and heat prevents exercise. In chronic diseases, as a class, changes of climate, diet, and occupation are among the chief remedies—especially of climate. Here we have the variety needed—from the eternal snows of the Californian Alps, through a dozen different phases of eternal spring and summer, to the burning sands of the Colorado Desert, with its four inches of rainfall in a year. The patient can dwell under the palm trees or in the orange groves of Los Angeles, under the giant fig trees of San Luis Obispo, in the vineyards of Sonoma, in the orchards of Santa Clara or of Yolo, in the evergreen oak groves of Alameda, amidst the mammoth trees of Calaveras, the majestic white oak groves of Napa, under the shadow of the cliffs of Yosemite, or amidst the sulphurous fumes of Geyser Cañon.

§ 90. *State Mortality Table.*—The following table of the mortality of certain towns in California, for the year ending June 30th, 1871, was prepared by Dr. Logan, Secretary of the Board of Health:

CITIES AND TOWNS.	Population.	Total number of deaths.	Ratio of deaths per 1,000 of population.	PREVALENT DISEASES.					
				Consumption.	Other diseases of lungs.	Diseases of the stomach and bowels.	Diphteria.	Scarlatina.	Typho-malarial fevers.
San Francisco	150,351	3,214	21.4	518	245	143	34	62	165
Sacramento	16,298	391	24.0	60	34	28	4	7	13
Petaluma	3,514	45	12.8	6	2	4		1	
Dixon and surroundings	5,000	17	3.4	2	2	1		1	
Santa Clara	3,470	92	26.5	18	5	11	2	3	6
Stockton	10,033	182	18.1	23	15	18	2		4
Marysville	4,375	127	29.0	16	18	4		3	13
Placerville	1,562	29	18.6	2	3	1			
Auburn and surroundings	2,500	15	6.0	4	1	2			
San Diego County	4,957	66	13.3	19	2	5	1		6
San Luis Obispo	2,000	28	14.0	9	2				
Oroville and surroundings	1,500	36	21.0	7	6				3
Woodland	2,200	23	10.5	3	3		1	3	3
Oakland	11,104	117	10.5	26	7	5	1	3	2
Los Angeles	5,641	76	13.5	17	9	6			2
Nevada City	5,500	36	6.5	6	3	3		1	1
Truckee and surroundings	1,220	16	13.1			1		1	
St. Helena and surroundings	3,000	15	5.0	5	3	2		2	
San Jose	9,091	193	21.2	25	13	21	7	3	12
Napa City	3,500	43	12.3	2	2	4			5
Fort Jones (Siskiyou) and surroundings	2,000	24	12.0			3		3	2
Watsonville	2,000	16	8.0	2		1			
Folsom and surroundings	3,000	15	5.0	3	5		1		
Bridgeport Township	3,000	15	5.0						
Twenty-four localities	256,783	4,831	18.6	774	380	270	53	93	237

§ 91. *Prevalent Diseases.*—We have in California less consumption, scarlet fever, cholera infantum, and sunstroke, than in the Atlantic States, and more rheumatism and neuralgia, heart disease, aneurism, and diseases of the eyes, than in the Atlantic States. In some districts we have far less malarious disease; in others, as much. It has been observed that ozone is rare where malarious epidemics prevail, and that it is abundant in the trade winds that blow throughout the summer along our coast. Whenever the winds stop for a few days in the middle of the Sacramento-San Joaquin basin, malarious fever prevails. In the natural advantages of the coolness of summer climate, all those conditions which indicate malaria, the constancy and force of the breezes, and the abundance of ozone, San Francisco has no equal among the great cities. Sunstroke, which has in one season killed 300 persons in New York city, is almost unknown here, even in the interior valleys, where the summers are much hotter than in New York. The dryness of our atmosphere secures a rapidity of evaporation which keeps down the temperature of the body. Neither are any lives lost in our valleys by the intense cold, such as killed seventy persons, and maimed thirty more, in Minnesota, in the winter of 1872–73.

§ 92. *Mineral Waters.*—California is peculiarly rich in mineral waters. Elsewhere the springs suitable for medicinal purposes are few and far apart; here they are found in great clusters, and they may be numbered by the thousand. They extend from the borders of Oregon to Mexico, and from the edge of the Pacific to the alkali plains of the Great Basin. Surprise Valley, in latitude 41° 40′, at the eastern base of the Sierra, has hundreds of hot and cold saline, chalybeate, and sulphur springs; the mud volcanoes of the Colorado Desert, and the hot springs of Warner's Valley, are samples of what are to be found in the extreme south; but the most remarkable collections are in Napa, Sonoma, and Lake Counties, about a hundred miles north of San Francisco, and conveniently accessible by steam and stage.

Mount St. Helena, in the first of those counties, the Geysers in the second, and Clear Lake in the third, all of volcanic origin, and at least two of them the craters of great volcanoes, are the three corners of a triangle, with sides thirty miles long, and an area that was once alive with subterranean fires. The basaltic columns in regular crystallization, found near the summit of St. Helena, extensive strata of trap covering the adjacent ridges, the tufa formed by torrents of mud or wet sand, that came from volcanic vents on the triangle, making up considerable parts of the ridges between Suisun and Napa, and between Napa and Sonoma Valleys, the petrified forests near Calistoga, the sulphur bank and the borax pond near Clear Lake, all indicate the remarkable influences that were active in that region in a remote age. Not unworthy of their associates, are the mineral springs in the same region. We find them hot, warm, and cold; rich in sulphur, iron, alum, Epsom salts, carbonates, chlorides, and borates of soda, carbonic acid, sulphuretted hydrogen, carburetted hydrogen, and other gases.

The following analytical table gives the number of grains of the different solids contained in a gallon of certain mineral waters of California. The analysis of Napa Soda was made by L. Lanzweert; those of the White Sulphur water by Prof. John Le Conte; that of Sanel by Dr. J. A. Bauer; that of Adams by Thomas Price; and the others by unknown authorities.

MINERALS.	Napa Soda.	New Almaden.	Paso Robles, No. 1.	Paso Robles, No. 2.	White Sulphur, No. 2.	White Sulphur, No. 6.	White Sulphur, No. 7.	Adams.	Saratoga.	Calistoga.	Geyser.	Sanel.	Summit Soda.
Chloride of Sodium	5.2	33.6	96.4	27.1	21.7	23.4	14.2	4.1	119.1	22.3	9.9	17.2	26.2
Chloride of Lime					1.3	.8	.7			3.2			
Chloride of Magnesia					.8	2.2	.6						
Carbonate of Soda			5.2					57.0	123.3	3.4			9.5
Bicarbonate of Soda	13.1	201.2		50.7							23.4	53.2	
Carbonate of Magnesia	26.1		3.1		.6	.5	4.3	99.0				45.2	4.2
Bicarbonate of Magnesia				.9							9.8		
Carbonate of Lime	10.8				1.2	2.4	5.5	28.7	17.2		4.5	70.4	
Carbonate of Iron	7.8							.5	14.0		3.8		
Bicarbonate of Lime		32.0											43.2
Sulphate of Soda	1.8		41.1	7.8	8.2	11.3	12.8		12.1	1.6	3.4		
Sulphate of Magnesia		12.0								.4			
Sulphate of Lime		42.0	17.9	3.2									
Silica		tr	1.1	.4				7.2		6.5	1.8		2.0
Alumina	.6			.2									1.7
Magnesia													
Siliceous Acid	.6												
Silica and Alumina									49.8				
Oxide of Iron		4.		.3									1.7
Sulphate of Potassa				.8									
Sulphate of Sodium and Calcium					2.6	1.8	1.6						
Organic Matter			3.4	16.4				2.8					
Loss	2.4										.3		
Total	68.7	432.3	108.3	93.4	36.6	42.6	40.0	199.4	335.8	37.5	57.1	186.0	88.6

There are traces of iodides and bromides in Paso Robles Spring No. 2; of nitric acid and salt of potash in Adams Spring; of sulphate of potash in Summit Soda Spring; of magnesia in Saratoga; of siliceous acid and carbonate of iron in Sanel; of silica in New Almaden, and of alumina in Calistoga.

Adams has 304, New Almaden 112, Summit Soda 186, Paso Robles No 1, 47, Paso Robles No. 2, 10 cubic inches of carbonic acid gas in a gallon; Sanel has an abundance; and Napa Soda has also an abundance, probably exceeding any of the others. Paso Robles No. 1 has 10 grains of carbonic acid to the gallon, the only instance of determining its quantity by weight.

White Sulphur No. 1 has 6, White Sulphur No. 2 has 4, White Sulphur No. 3 has traces, Calistoga has 3 cubic inches, and Paso Robles No. 1 has a saturating quantity of sulphuretted hydrogen.

The Paso Robles Spring marked No. 1 is the "Mud Spring"; the Sanel Spring has been called the "California Seltzer"; the Saratoga, the "Pacific Congress"; the New Almaden, the "California Vichy," and so on.

The carbonate of soda, carbonate of iron, iodides and bromides, are among the most beneficial thereapeutic agents found in mineral water; but sulphates of magnesia, and soda and phosphates, are also desirable; and the iodides and bromides, of which traces are found in the waters of Paso Robles, are especially valuable in certain diseases.

§ 93. *Health Resorts.*—The places which have been most in favor with Americans of late years, as health resorts for consumptives, have been Mentone and vicinity, in southeastern France, Florida, Minnesota, and California. The tables given in the chapter on climate, will enable the reader to compare the temperature and rainfall of these places. We pronounce, without hesitation, against Florida and Minnesota: the former, because it is very moist as well as too warm, and the latter, because it is very cold. Neither is fit for residence through the year. Santa Barbara, which may be regarded as the type of the entire coast district south of Point Argüello, is 14° warmer in January than Mentone, and has eight inches less rain. St. Helena very nearly resembles Mentone, being two degrees warmer in January, four degrees warmer in July, and having about seven inches more rain.

There are, however, extensive districts in California for which we have no meteorological tables, and some of these may hereafter come into higher favor with consumptives than any of those to which they now throng. Among these, Pope and Berreyesa Valleys, east of Mount St. Helena, and the head of the Salinas, Saticoy, and Cuyama Rivers, between latitudes 34° and 35° 30′, deserve special attention. These valleys are west of the Diablo ridge, but are protected against the ocean winds and fogs by a distance of about thirty miles covered with mountains, beyond which the air is dry and the climate warm.

Special attention should be given to the fact that Dr. J. H. Bennet, who first brought Mentone into notice as a health resort for consumptives, and whose book, "Winter in the South of Europe," is our authority, strictly orders his patients to leave Mentone in the spring, because the summer is too warm and moist.

§ 94. *San Rafael and St. Helena.*—The places most in favor as sanitariums in California, are San Rafael, St. Helena, Santa Barbara, Los Angeles, and San Diego.

San Rafael is fifteen miles north of San Francisco, and eight miles from the ocean, and has less fog and wind than any other town near the edge of San Francisco Bay. It is not equal in the dryness of its atmosphere and the scantiness of rainfall to the southern coast, but it has the great advantage that its residents can spend five or six hours in the middle of the day in San Francisco, and thus attend to business there. A thermometrical record shows that the mean temperature of January, is 50° at 9 A. M., 58° at 12 M; 60° at 3 P. M., and 51° at 6 P. M.; while in July the means for the same hours are 59°, 65°, 68° and 66° respectively. These figures not having been kept at the times usually observed by meteorologists, cannot be compared safely with the other figures kept according to rule.

St. Helena is forty miles from the ocean and fifty miles north of San Francisco, near the head of Napa Valley, and shut in by high mountains, which cut off the wind and fog. Though the rainfall is greater than at San Rafael, yet the atmosphere is drier and more agreeable to consumptives and asthmatics. The distance from San Francisco is three times greater than to San Rafael, yet the people of St. Helena can come to the metropolis, spend three hours, and return the same day. About two miles away are the White Sulphur Springs, a fashionable summer resort; eight miles off is Calistoga, another summer resort, and eight miles further is the summit of Mt. St. Helena. The town is in the center of a grape-growing district, and unimproved land ranges from $100 to $200 per acre in the vicinity.

§ 95. *Santa Barbara.*—Santa Barbara, in latitude 34° 24′, on the ocean shore, about forty miles east of Point Argüello under the shelter of the Santa Inez ridge, which runs east and west, is more in favor at present with consumptives than any other town in the State. Dr. Logan, Secretary of the Board of Health, has recommended it as having the best climate in the State for diseases of the respiratory organs. He says: "Bounded on the north by the Coast Range Mountains, of an average height of 3,000 feet, which prove an insurmountable barrier to the peculiar harsh oceanic winds, and on the south by a channel formed by the Santa Cruz and other islands, some twenty miles distant, which serve as well to deflect the cold current that sweeps down from the Arctic seas as to afford protection from the concomitant cold fogs that roll in so uninterruptedly in other parts of the coast, this portion of California stands out pre-eminently the land of promise to the weary desponding invalid."

Dr. Brinkerhoff, a resident of Santa Barbara, writes thus: "Some ten miles from Santa Barbara, in a westerly direction, in the bed of the ocean, about one and a half miles from the shore, is an immense spring of petroleum, the product of which continually rises to the surface of the water, and floats upon it over an area of many miles. This mineral oil may be seen any day from the decks of the steamers plying between here and San Francisco, or from the high banks along the shore, its many changing hues dancing upon the shifting waves of the sea, and affording various suggestions, both for the speculative and the speculator. Having read statements that, during the past few years, the authorities of Damascus, and other plague-ridden cities of the East, have resorted to the practice of introducing crude petroleum into the gutters of the streets to disinfect the air, and as a preventive of disease, which practice has been attended with the most favorable results, I throw out the suggestion, but without advancing any theory of my own, whether the prevailing westerly sea breezes, passing over this wide expanse of sea-laden petroleum, may not take up from it and bear along with them to the places whither they go, some subtle power which serves as a disinfecting agent, and which may account for the infrequency of some of the diseases referred to, and possibly for the superior healthfulness of the climate of Santa Barbara."

Whether the claim of superiority for Santa Barbara over any other place in California be justified or not, all must admit that it has great advantages of climate and position. It is a town of about 4,000 inhabitants, has a beautiful site, fine gardens and orchards, and has become the leading health resort of the New World.

§ 96. *San Diego.*—San Diego ranks next in public favor to Santa Barbara, and has a similar climate, except that the rainfall is thirty-three per cent. less, and the humidity of the atmosphere greater. Dr. Beverly Cole, who is cited by the people of San Diego as authority, speaks thus of its advantages:

"The wind blowing steadily from one quarter insures healthiness. Take a place where the wind blows in the morning from the west, and in the afternoon from the north; to-day from the south, and to-morrow from the northeast, and you will see that the people inhabiting that place are seriously affected by the sudden and abrupt changes. This is easily explained. The sudden changes interrupt the action of the skin, and cause the poisonous matter that should be eliminated therefrom to be thrown back on the internal organs, thereby causing disease. The great difference in the velocity of the wind at this point and elsewhere is also noticeable. The average number of miles traveled during the eight months' observation I have referred to, was thirteen miles per hour at 2 P. M.; during the rest of the day it will not exceed from three to five miles per hour. The great velocity acquired by the wind at San Francisco and other places, impairs health by vaporizing the moisture of the skin and thereby rendering the surface cold. The remarkable lightness of the wind can therefore be set down as a cause of exemption from sudden and serious colds, that often grow into pulmonary complaints. The humidity of the atmosphere is also of the greatest importance. There is a disposition to rely too much on the absence of moisture. There *was* moisture in the air of San Diego, as the observations proved, and it was a very necessary quality. The application of an ointment to a sore was not because the ointment contained curative powers, but simply to protect it from the irritating action of the air. This shows that moisture, and not its opposite, is necessary. It would be folly in a man with ulcerated lungs to seek the rarified air of a high mountain. The action of the oxygen would prove positively injurious, because it would irritate the lungs, which require, instead of extreme dryness, exactly the reverse condition of the atmosphere—moisture."

The entire coast between Santa Barbara and San Diego, with an average width of twenty miles, and an area of three thousand square miles, will probably be occupied for a health resort. Among the towns along the shore are Ventura, Hueneme, Santa Monica, San Pedro, Wilmington, Anaheim Landing, San Juan Capistrano, San Luis Rey, and San Dieguito. Between ten and thirty miles back are Santà Paula, Triunfo, Camula, San Fernando, Los Angeles, San Gabriel, Monte, Nietos, Anaheim, Riverside, Temascal, Temécula, Pala, and Joya. Still further back, and most of them at an elevation of 1,000 feet or more, are San Bernardino, Cocumongo, Jurupa, Weaver, Warner, and San Felipe.

§ 97. *Klamath Valley.*—Of the Klamath Valley, Dr. T. T. Cabanis says:

"Rheumatism, croup, bronchitis, pneumonia, and pleurisy, are almost unknown, and during a residence of fourteen years in this portion of the State, I have never seen but two cases of tuberculous consumption. These did not originate here. Ten cases of croup would cover all which I have witnessed. I cannot now recall to my mind more than ten cases of pneumonia. When it is considered that the population of this county, being miners and farmers who are greatly exposed to bad weather, and have to endure great hardships, it is a matter of surprise that so few cases of diseases of the lungs are known here. Though much is due to the climate, there is one thing which exercises a remarkable influence on this subject, and that is, that the people, as a general thing, live in a primitive manner. They live in houses which are very open, and they use chimneys in the place of stoves."

There are a few localities where intermittent fever prevails during the Fall, but it yields very readily to small doses of quinine—never leaving any of the sequelæ behind which are found following that form of disease in hot climates. Neuralgia is frequently seen, but it often depends upon derangement of the digestive organs. Were people to closely observe the laws of health, it would be a rare sight to find a sick man among us. The diseases which are the most prevalent, are those which follow errors of diet.

§ 98. *Earthquakes.*—Earthquakes belong, on scientific considerations, in the chapter in geology; but practically they come within the domain of salubrity, for many persons in the Eastern States object to California as a place of residence, because of the danger from those convulsions of the globe. There is a possibility of death from them, but the possibility is so remote that it does not disturb the enjoyment of life here. In twenty years, about forty deaths have been recorded in the State, and not one of these occurred in a strong house. The majority of the victims lived in walls of adobe, or dried mud, ready to topple over at a slight shock. In San Francisco, several thousand brick houses, many of them three, and some four stories high, have stood for fifteen years, or more, not only without coming down, but without showing any mark of injury, beyond slight cracks in the plastering. The deaths from earthquakes have been about two annually, or at the rate of one in a quarter of a million; while, in the Eastern States, lightning, sunstroke, and hurricanes, which kill nobody here, have each slain three times as many relatively.

Most of the earthquakes of California are confined to very small districts. Thus, not more than one in ten of those felt in San Francisco is perceived in Sacramento. Many shocks are slight, and observed only by a few people. The question is frequently asked in San Francisco, "Was there an earthquake last night?" Somebody felt a slight tremor in the house; perhaps it was caused by an earthquake—perhaps by a heavy wagon passing through the street. Tourists occasionally express great disappointment because a shock came, and was so slight that they did not feel it, either because they were asleep, or were walking. Many persons in the street, when the shock of October 21st, 1868, occurred, did not feel it, and when they saw the people rushing out of the houses, wondered at the excitement.

We frequently hear San Franciscans say, this is "earthquake weather," when it is sultry, but there has been nothing in experience to justify such language. No peculiar condition of the temperature of the sky, or of the barometer, has uniformly, or generally, preceded the shocks, nor is there any rule by which we can predict their occurrence, nor have we any instrument by which we measure precisely their duration, violence, or the course of their vibrations.

§ 99. *Their Frequency.*—Earthquakes are common in some parts of California, and especially at San Francisco, Los Angeles, and near the Tejon Pass, at the southern junction of the Sierra Nevada and Coast Mountains. They are rare at Sacramento, Marysville, Vallejo, and Napa. As a general rule, they are less frequent and less severe in the northern than in the southern part of the State. The vicinity of Humboldt is more often shaken than any other place north of the Bay of San Francisco. About a dozen earthquakes are felt in a year at different places in the State; not so many at one place. Most of the shocks are so slight as to pass unnoticed by a great majority of the people; and there are persons who have resided six or eight years in San Francisco, and many who have resided ten years in other parts of the State, and say they have never felt an earthquake. No strongly-built house has been injured, by an earthquake in California, north of latitude 35°, since the American conquest. Several brick walls have been cracked in San Francisco, but they were weak structures, built on "made ground," and would, perhaps, have cracked by settling, of their own weight. Large four-story houses have been so much shaken, that the inmates have run out in great alarm; but, on examination, it was found that the buildings were uninjured, even in the slightest perceptible manner.

On one such occasion, a gentleman, who thought his life in great danger, and ran to save it, observed, before he left his room, that the water was splashed out of his basin by the movement of the house. The basin was of earthen-ware, about fifteen inches in diameter at the top, six inches deep, half full of water, and it stood on an ordinary wash-stand. He supposed that, with another such a shock or two, the building must be in ruins; and he was very much astonished to find that there was not the slightest crack in the walls or plastering. His room was in the fourth story of a brick hotel. It seems that the whole building had moved together.

The fear of earthquakes prevents the erection of high structures for show; and, for this reason, there are few tall steeples in San Francisco. Several churches have been commenced on such a plan that they might be crowned with lofty spires, but it was thought more prudent to leave them with low towers. The same motive induces many wealthy families to reside in wooden houses, which are considered better fitted to resist the shocks of earthquakes. These wooden houses, it must be kept in mind, are not "framed" with mortices and tenons, as large wooden houses are usually erected in the Atlantic States, but are "Chicago frames," held together with nails. This style of building, though introduced solely because of its cheapness and simplicity, is considered, by far, the most secure against earthquakes.

Few earthquakes felt at San Francisco since 1846 have been more severe than one which visited Buffalo, New York, in 1857, as described in the *American Journal of Science and Art* for September, 1858.

§ 100. *List of Earthquakes.*—The following is a list of the most notable earthquakes observed in California.

On the 11th October, 1800, six severe shocks were felt at San Juan Bautista, and every house was shattered and rendered uninhabitable. The same earthquake was felt with much severity at San José.

On the 21st of June, 1808, twenty-one shocks were felt at San Francisco, and the few houses then existing were seriously injured.

In September, 1812, on a Sunday, an earthquake threw down the Mission Church at San Juan Capistrano, in latitude 33° 20′, and thirty persons were killed. The church at Santa Inez, in Santa Barbara County, was thrown down on the same day; but the shock, according to report, was an hour later than at

San Juan Capistrano, and there was nobody in the church when it fell. At the same time the sea receded a long distance from the ordinary place of the water's edge, on the beach of Santa Barbara; and the people there, knowing that it would soon rush upon the shore, fled to the higher ground, and by that means alone saved their lives.

The old Mission Church at Santa Clara was thrown down by an earthquake in 1818.

On the 15th of May, 1851, a severe shock was felt in San Francisco. Windows were broken; merchandise was thrown down from shelves in stores; and vessels in the harbor rolled heavily.

A severe shock of an earthquake was felt at Fort Yuma and vicinity on the 29th of November, 1852. The low grounds near the Colorado cracked open with long, wide fissures, from which water, sand, and mud, spouted up. The fissures were in some places so large, that they turned the river from its course; and the change was so sudden, that great multitudes of fish were left to die in the mud. At the same time, the mud-volcanoes of Lower California, distant forty-five miles southwestward from Fort Yuma, resumed their activity; for, although there is no record of their previous action, yet they probably existed before. A pool of hot, sulphurous water had been observed at the place by Americans since 1849. Immediately after the shock of 1852, the officers at Fort Yuma saw a great body of steam shoot up at least one thousand feet in the desert to the southwest; and when, soon afterward, some of them went out to examine into the cause of it, they found the mud-volcanoes on the site of the old pool, throwing up steam, boiling water, and mud, very much like the *salses* farther north.

On the 10th of July, 1855, an earthquake cracked the walls of twenty-six houses in Los Angeles; but no wall was thrown down, nor was any person injured.

The earthquake of January 9th, 1857, shook the earth from Fort Yuma to Sacramento, a distance of five hundred miles, being most severe at Fort Tejon, about half-way between these two points. Loud noises, either rumbling or like explosions, were heard to accompany the shock at Tejon, San Bernardino, Visalia, and in the Mojave Valley. The waters of the Mokelumne River were thrown upon the banks so as to almost leave the bed bare in one place. The current of Kern River was turned up-stream, and the water ran four feet deep over the bank. The water of Tulare Lake was thrown upon its shores; and the Los Angeles River was flung out of its bed. In Santa Clara Valley the artesian wells were much affected. Some ceased to run, and others had an increased supply of water. Near San Fernando, a large stream of water was found running from the mountains, where there was no water before. In San Diego, and at San Fernando, several houses were thrown down; and at San Buenaventura the roof of the Mission Church fell in. Several new springs were formed near Santa Barbara by the shock. In the San Gabriel Valley, the earth opened in a gap several miles long; and in one place the river deserted its ancient bed, and followed this new opening. In the valley of the Santa Clara River there were large cracks in the earth. A large fissure was made in the western part of the town of San Bernardino. At Fort Tejon the shock threw down nearly all the buildings, snapped off large trees close to the ground, and overthrew others, tearing them up by the roots, and tore the earth apart in a fissure twenty feet wide and forty miles long, the sides of which rent then came together with so much violence that the earth was forced up in a ridge ten feet wide and several feet high. At Reed's Ranch, not far from Fort Tejon, a house was thrown down, and a woman in it killed.

On the 26th of November, 1858, nearly every brick building in San José was injured by an earthquake.

On the 3d of July, 1861, Amador Valley, in Alameda County, was severely shaken. Adobe houses were seriously injured, chimneys toppled down, furniture was flung from side to side of the houses and much broken, and men in the fields were thrown down.

On Sunday, October 8th, 1865, at 12.45 P. M., a severe shock visited the coast valleys, from San Luis Obispo to Humboldt Bay. In San Francisco, weak brick buildings were shattered, cornices were thrown down, and several persons were seriously injured by falling bricks, and by injuries received in jumping out of windows.

The earthquake which destroyed many towns and killed many people in Peru, on the 13th of August, 1868, was not felt in California, but its tidal waves were observed here the next day. The sea ebbed and flowed in a remarkable manner from San Francisco to San Diego, from daylight till dark, the tides reaching heights not observed before, but doing no damage.

The severest earthquake observed in San Francisco since 1846, came on the 21st of October, 1868, about eight A. M. A dozen brick buildings on made ground were shattered so as to be untenantable, the cornices of two dozen were thrown down, many walls were cracked, much window glass was broken, and five persons were killed by falling bricks, and as many more had bones broken by jumping out of windows.

On the 26th of March, 1872, the southern part of the State was shaken up, the shock being most severe in Owen Valley, 275 miles southeast of San Francisco, and beyond the Sierra Nevada. Two hundred buildings, most of them cheap structures of adobes, were thrown down, and thirty-five persons were killed by the falling of the walls and roofs. Cracks opened several feet wide, and then came together with so much force that ridges were thrown up. Springs disappeared in some places, and appeared in others. The level of Owen Lake raised four feet, or the ground on one side seemed to have sunk as much.

CHAPTER V.

SCENERY.

§ 101. *Introductory.*—California has much beautiful scenery. The atmosphere is remarkably clear, giving the eye a wide range. The mountainous character of the State not only prevents monotony and secures a rich variety of landscapes, but gives them extent and grandeur. The large rivers, the high snow-peaks and ridges, wide bays, forests of the largest and most graceful evergreens, parks of majestic oaks, natural meadows, covered in the spring with brilliant grasses and flowers, are all magnificent in their kind. The low lands are mostly bare of timber, with here and there a grove of oaks, and lines of trees and bushes along the water-courses. The coast valleys are very beautiful; and, in the course of ten or fifteen years, when ornamented with thorough cultivation, will be as pretty as any places in the world. The most remarkable features of our scenery are: Yosemite, the Big Tree Groves, the Geysers, the Petrified Forest, Mt. Diablo, Mt. St. Helena, Mt. Tamalpais, Mt. Shasta, the Californian Alps, Clear Lake, and Lake Tahoe.

§ 102. *Yosemite.*—Yosemite Valley, one of the greatest natural wonders of the world, is a chasm eight miles long and a mile wide, in the western slope of the Sierra Nevada, thirty miles west of the summit, and one hundred and forty miles east of San Francisco, in a direct line. The bottom of the valley is 4,060 feet above the level of the sea, and its general course is east and west. The sides are granite walls, rising steeply—in many places, almost vertically—to a height varying from 1,200 to 4,600 feet. The Merced River runs through the valley, escaping at the lower end through a narrow and rugged cañon.

Among the attractions of Yosemite, are a dozen cliffs, more than 3,000 feet high, eight cataracts, of which one is 1,700 feet high, and five dome-shaped mountain peaks. No such collection can be found elsewhere within the same area, and they are accompanied by valley scenery of great beauty. The general judgment of travelers has decided that Yosemite is more worthy of a visit, for grand and picturesque scenery, than any other place known to them.

§ 103. *Opinions of Tourists.*—Some of these opinions are worthy of record here. Prof. J. D. Whitney says:

"The peculiar features of the Yosemite are: first, the near approach to verticality of its walls; next, their great height, not only absolutely, but as compared with the width of the valley itself; and finally, the very small amount of debris, or talus, at the bottom of these gigantic cliffs. These are the great characteristics of the valley throughout its whole length; but, besides these, there are many other striking peculiarities and features, both of sublimity and beauty, which can hardly be surpassed, if equaled, by those of any other mountain scenery in the world."

Horace Greeley wrote thus:

"Of the grand sights I have enjoyed—Rome from the dome of St. Peter's—the Alps from the valley of Lake Como—Mont Blanc and her glaciers from Chamouny—Niagara—and the Yosemite—I judge the last-named most unique and stupendous. It is a partially-wooded gorge, one hundred to three hundred rods wide, and 3,000 to 4,000 feet deep, between almost perpendicular walls of gray granite, and here and there a dark yellow pine rooted in a crevice of either wall, and clinging with desperate tenacity to its dizzy elevation. The isolation of the Yosemite—the absolute wilderness of its sylvan solitudes, many miles from human settlement or cultivation—its cascade 2,000 feet high, though the stream which makes this leap has worn a channel in the hard bed-rock to a depth of 1,000 feet—renders it the grandest marvel that ever met my gaze."

The opinion of Starr King was that—

"Nowhere among the Alps, in no pass of the Andes, and in no cañon of the mighty Oregon range, is there such stupendous rock scenery as the traveler now lifts his eyes to."

The following is an extract from Samuel Bowles:

"Indeed, it is not too much to say that no so limited space in all the known world offers such majestic and impressive beauty. Niagara, alone, divides honors with it in America. Only the whole of Switzerland can surpass it—no one scene in all the Alps can match this, before me now, in the things that mark the memory and impress all the senses for beauty and for sublimity."

§ 104. *The Leading Features.*—The tourists who enter the valley by the trails that lead over the mountains, north and south of the cañon, obtain fine views just before commencing the descent. The chasm is seen winding away amidst the cliffs; a cascade is in sight, and numerous mountain-peaks rise in various directions. At the bottom of the dell are the meandering river, the green grass, and lofty trees diminished to the appearance of shrubs. The Bridal Veil fall, seen on the right, several miles distant, is a mere white streak on the face of the rock, and does not appear grand in the least, but it is nine hundred and forty feet high, and becomes imposing as the traveler approaches it. The body of water is about seventy feet wide on the first of June.

Nearly opposite this cascade, on the northern side of the valley, and about three-quarters of a mile distant, but apparently much nearer when the tourist looks up at it, is the Capitan, (or Captain) a rock projecting into the valley and rising up perpendicularly from the level green-sward three thousand three hundred feet. It has two faces, which meet nearly at a right angle, one facing to the south, and the other to the west. It is regarded as one of the grandest features of the Yosemite scenery. The Indian name is Tutucanula.

The next object of interest as we ascend the valley, is the Three Brothers, or Pompompasus. The highest of these reaches an elevation of 4,000 feet above the valley, and according to Clarence King, the best general view of the valley can be obtained from its summit.

A mile beyond the Bridal Veil, on the south side of the valley, we come to the Cathedral Rocks, which, as seen from the eastward, suggest the architecture of the medieval cathedrals. They rise to a height of 3,000 feet, and near them are the Cathedral Spires, each about 700 feet high and 300 feet in diameter. They do not look so large, however, to the spectator, who looks up nearly half a mile from the valley to their base.

Sentinel Rock, a natural obelisk, about 1,000 feet high and 300 feet in diameter at the summit, and 3,043 feet above the valley, is on the south side of the valley, about five miles from the western end. It stands out from the adjacent cliff in such a manner as to be one of the most striking objects in the landscape from many different points of view.

Directly opposite to Sentinel Obelisk, are the Yosemite Falls, the upper one 1,700 feet and the lower 400, with a distance of half a mile, and a descent of 626 feet in a series of small cascades, which are not visible from the valley between them. The falls are made by Yosemite Creek, which is fed by the melting snows on the southern slope of Mt. Hoffman, two miles distant. The stream is usually thirty feet wide and ten feet deep, with a speed of a mile an hour, about the middle of June, but its size depends entirely on the stock of snow and the heat. A hot day, when the snow is abundant, makes a perceptible difference in the size of the cascade. The best general view of both falls is obtained from the south bank of the Merced River, more than a mile from the upper fall, which from that distance looks like a ribbon of mist, and is entirely inaudible. Yosemite Creek dries up some time between the first of July and the last of August, according to the seasons.

A little more than a mile eastward from the Yosemite Falls, is a vertical wall of granite, half a mile long, and nearly 2,000 feet high, from which some scales of rock have fallen down, leaving arches like eyebrows, several hundred yards long, projecting sixty or seventy feet beyond the surface of the wall beneath. They are called the Royal Arches.

Adjoining this wall on the east, and attached to it, is Washington Column, which, as seen from the westward, looks like a half pillar.

Half a mile eastward from the Washington Column, is Mirror Lake, a shallow body of water, covering an area of several hundred acres. It is remarkable on account of the perfect smoothness of its surface, at certain times—early in the morning, for instance—before the winds have commenced to blow, and then the neighboring cliffs are reflected with wonderful clearness and accuracy. This lake is an enlargement of Tenaya Creek.

The Half Dome, three-quarters of a mile southeastward from Mirror Lake, is part of a dome which was cut through vertically, and half of it carried away. The side next the valley is perpendicular for 2,000 feet from the summit, which is 4,734 feet high. Professor Whitney claims for it, "the first place among all the wonders of this region."

Opposite to the Royal Arches, and two miles east of the Sentinel Obelisk, the Little Yosemite Valley enters the main valley. Its stream is the Merced River, which there flows down through a rugged and narrow cañon. On this stream, a mile after leaving the main valley, we come to the Vernal Fall, 400 feet high. The water in this tumble has a greenish color, unlike the others, which are broken into white spray.

A mile further on the same stream, is the Nevada Fall, 600 feet high. It is, in many respects, the handsomest and grandest of all the cascades in the Yosemite region. Between the Vernal and Nevada Falls, the river descends 275 feet, and is broken into foam for a large part of its distance.

Three-quarters of a mile southwestward from the Vernal Fall, is Toloolweack, or, as Whitney spells it, Illilouette Fall, never measured, but estimated to be 600 feet high. Toloolweack Creek, below the cascade, runs through a rugged cascade, in which immense rocks lie piled upon one another, with great open spaces beneath them.

Half a mile southeastward from Sentinel Obelisk, is the Sentinel Dome, 4,150 feet high. From its summit, very extensive views can be gained.

Glacial Point, a little more than a mile eastward from Sentinel Obelisk, commands extensive views.

The South Dome, or Mount Starr King, is two miles southeastward from the Nevada Fall, and is the most regular in shape of all the mountain domes. Its summit is 6,500 feet above the valley, and is inaccessible.

Immediately north of the Nevada Fall, rises the Cap of Liberty, or Mount Broderick, to a height of 4,600 feet above the valley.

Several miles eastward from the Half Dome, is the Cloud's Rest, 5,700 feet above the valley.

The North Dome, 3,568 feet above the valley, is half a mile north of the Washington Column.

§ 105. *Cascades of Rockets.*—It is impossible to convey, by description, a clear conception of the grandeur, the variety, and the singular character of the Yosemite scenery. A large number of excellent photographs show many of the beauties of the place faithfully. A peculiar feature in most of the cascades is not caught in the photographs—I mean the rocket forms of the water, which, as the spectator looks up, seems to shoot down or out, in forms like a succession of rockets, each composed of a head of white water, leaving a trail of snowy sparks behind it, until it is exhausted, and others succeed it.

All the cacasdes, save the Vernal, are thoroughly white, and rockety at the top. The rockets of the Upper Yosemite are distinctly perceptible from the Yosemite Hotel, a mile and a half away. This feature impressed me very strongly, and yet I have never seen a recognition of it in any of the descriptions of the valley, or pictures of the falls.

§ 106. *Vegetation, etc.*—There are a thousand nooks and corners, and woody dells, full of enchanting picturesqueness. The rocky cliffs take all manner of queer forms, resembling pyramids, castles and domes, chimneys and spires. In one place, there is a narrow cleft, one hundred feet deep, in one of the rocks, as though some giant had commenced to split off part of the mountain, and had left his work unfinished.

The river, as it meanders through the valley, is a great addition to its beauty; and its waters, as well as those of the lakes, are clear as crystal in the summer, though turbid in the spring. Mountain trout are found in all these streams.

The climate of the valley is cool. The numerous cascades agitate the air; and, near the fall, there are often gusty winds.

There is much difference between the vegetation and temperature of the two sides of the valley; the northern side, where the sunshine is felt throughout the day, being much warmer than the shadows of the southern cliffs. Shrubs and flowers are in the full glory of foliage, and flower along the northern wall in May and June, while the same species are still bare or budding a mile to the southward; but the more delicate annual shrubs are usually more healthy on the southern than on the northern side of the stream, because those in the warmer spots are stimulated to come out so early as to be badly nipped by the frosts, which prevail here all through the spring, and into the summer.

In ordinary winters, five feet of snow lies in the valley, and the cascades are surrounded, at the base, by hills of frozen spray.

§ 107. *Formation of the Valley.*—There are three theories to explain the formation of the valley. Professor J. D. Whitney thinks that the bottom "sank down to an unknown depth, owing to its support being withdrawn from underneath during some of those convulsive movements which must have attended the upheaval of so extensive and elevated a chain." That is the subsidence theory. The glacial theory, that the glaciers coming down the mountain side scooped out this immense chasm, is advocated by John Muir, a geologist who has spent much time in the Yosemite region. Nobody advocates the theory of erosion. Ordinary water currents could not have worn away walls so vertical and crooked as these, nor could glaciers have done so, even if there had been an outlet. I believe the fissure theory, but will attempt no argument for it here. The rock split apart, and it still preserves the shape that would follow a great crack in the solid crust of the earth. The subsidence theory would do in the vicinity of a volcano, and in a different rock formation; but not in granite, high up on a ridge that has never been volcanic in its character.

§ 108. *Hetchhetchy.* — A chasm similar to Yosemite is Hetchhetchy, twelve miles further north, on the Tuolumne River. This valley is three miles long, half a mile wide, and fenced in by granite cliffs from 1,500 to 2,500 feet high. There are several fine cascades, including that of Hetchhetchy Creek, 1,700 feet high. The scenery bears a strong general resemblance to that of Yosemite, but is on a smaller scale. Above Hetchhetchy Valley, the cañon reaches thirty miles into the mountains, with walls nearly vertical for a large part of the distance, and much remarkable scenery, including many high cascades.

On the south side of Mt. Whitney, King's River forms a wonderful cañon, more than a mile deep, with a level bottom, in one place half a mile wide and ten miles long.

§ 109. *Big Tree Groves.* — The mammoth sequoias are prominent features in the scenery of California. A tree three hundred feet high and thirty feet thick in the trunk, is a great curiosity, and here we have numerous groves of them. Calaveras County has two; Tuolumne, two; Mariposa, three; and Fresno and Tulare, many.

The Calaveras Big Tree Grove, containing one hundred and fifty trees, ninety of them more than fifteen feet in diameter, was the first discovered, is nearest the center of the State, is more conveniently accessible than the others, has better accommodations for tourists, and attracts the greatest number of visitors. There are in this grove ten trees thirty feet in diameter, and eighty-two between fifteen and thirty, making ninety-two over fifteen feet through. One of the trees, which is down, must have been four hundred and fifty feet high and forty feet in diameter. The "Horseback ride," one of the notabilities of the place, is a hollow trunk, through which a man can ride upright on horseback, seventy-five feet.

In 1854, one of the largest trees, ninety-two feet in circumference and three hundred feet high, was cut down. Five men worked twenty-two days in cutting through it with large augers. On the stump, which has been smoothed off, there have been dancing-parties and theatrical performances; and for a time a newspaper, called the *Big Tree Bulletin*, was printed there. An examination of its rings showed that it was about 2,000 years old.

At the same time that this tree was cut down, another was stripped of its bark for a distance of one hundred and sixteen feet from the ground. This tree continued green and flourishing two and a half years after being thus denuded, and did not begin to show signs of dying until a very hard frost came in the winter of 1856–57. Seven years passed before it died.

In many of the trees in all the groves, hollows are burned at the foot, and some of them have been burned so as to stand on three legs. One of these, in the Calaveras grove, called "Uncle Tom's Cabin," has an open space under it of more than a dozen feet square. The largest trees seem to end abruptly at the top, having been broken off by the snow, which often falls to a great depth so high up on the Sierra Nevada. The trees, in some places, grow very near together; in others, they are comparatively far apart; and occasionally two or three will be seen which are united at the ground, although they may have been twenty or thirty feet apart when they sprouted. The Tuolumne Big Tree Grove, on the wagon road from Big Oak Flat to Yosemite, has two dozen Sierra sequoias, most of them ten feet or less in diameter, but one of them about twenty-five. It is one of the smallest and least imposing.

A wagon road projected to run from Coulterville, passes through the Merced Grove, a few miles west of Yosemite Valley.

The State Grove, in Mariposa County, is fifteen miles south of Yosemite, and has been given by Congress to California for a public pleasure resort. It has four hundred and twenty-seven trees, including one hundred and thirty-four over fifteen feet in diameter, eighteen over twenty-five feet, and three over thirty-three feet.

§ 110. *Mountain Peaks.*—Mount Diablo, or as the Spaniards and many others call it, Monte Diablo, thirty miles eastward from San Francisco, rising to a height of 3,856 feet, an isolated cone in the midst of a fertile and populous country, offers one of the most extensive and interesting views in the world. It overlooks the San Francisco, San Pablo, and Suisun Bays; the Santa Clara, San Ramon, San Joaquin, Sacramento, Suisun, Napa, and Sonoma Valleys, and commands a view of the Sierra Nevada for a length of two hundred and fifty miles from Mt. Lassen to Mt. Whitney. The Sierra rises like an amphitheatre, and Diablo is the point from which it can be seen to the best advantage. Though not so high as a score of other peaks in the Coast Range, nor half so high as a hundred in the Sierra, it is familiar to, and is seen every clear day by more people than any other mountain in California. It commands a view of an area of 40,000 square miles of land—as much as the entire State of New York. J. D. Whitney, in the first volume of the State Geological Survey Report, says: "It is believed there are few, if any, points on the earth's surface from which so extensive an area can be seen as from Monte Diablo." San Francisco, Sacramento, Stockton, Vallejo, Antioch, Redwood City, the Farallones, and the Marysville Buttes, are all distinguishable.

A ride of sixteen miles from Martinez, half of it on horseback, or of twenty-six miles from Oakland, including ten on horseback, enables a person to reach the summit. Accommodations have been provided on the mountain for visitors.

Mount Shasta at the north, and Mount San Bernardino at the south, occupy positions of relative prominence somewhat like that of Diablo in the middle of the State, towering far above the surrounding country. Shasta is clothed with snow for a distance of a vertical mile from the summit most of the year, and is a sublime feature of the landscape; it is visible in every direction to a distance of a hundred miles.

The State Geological Survey discovered, in the summer of 1864, that in the Sierra Nevada, between the latitudes of 35° and 38°, an area of 300 square miles or more has an elevation exceeding 8,000 feet, with 100 peaks that rise above 10,000 feet, and one that reaches 14,900 feet, the highest point in the United States, and 500 feet higher than Mount Shasta. The latter makes a more imposing appearance, because it rises in solitary grandeur 7,000 feet beyond the tops of any mountain within fifty miles of it, whereas, Mount Whitney is surrounded by other peaks of nearly equal elevation, and is not distinguishable or, at least, is not a striking landmark, from any large town or main line of travel in the State. Switzerland has, for hundreds of years, had the fame of possessing the greatest area of land elevated nearly to the level of perpetual snow, and the largest number of great peaks within the limit of high civilization; but is now surpassed by this Alpine region of California, which reaches from Kern River to Castle Peak, a distance of two hundred miles.

The following is a list of some of the prominent peaks on the Sierra Nevada:

PEAKS.	ELEVATION.	LATITUDE.	
		deg.	min.
Mount Whitney	14,900	36	32
Mount Shasta	14,442	41	25
Mount Tyndall	14,386	36	40
Mount Dana	13,227	37	52
Mount Lyell	13,217	37	44
Mount Brewer	13,886	36	42
Mount Silliman	11,623	36	38
Mount Lassen	10,577	40	30
Mount Gardner	......	36	46
Mount Kearsarge	......	36	46
Mount King	......	36	48
Mount Humphreys	......	37	15
Mount Goddard	......	37	05
Red Slate Peak	......	37	32
Cathedral Peak	......	37	50
Mount Hoffman	......	37	50
Castle Peak	......	38	04
Downieville Butte	......	39	35
Kaweah Peak	......	36	31

The peaks of which the elevations are not given, are supposed, except the Downieville Butte, to be at least 10,000 feet high.

The following are some of the peaks in the Coast Range:

PEAKS.	ELEVATION.	LATITUDE.	
		deg.	min.
North Yolo Balley	.....	40	30
South Yolo Balley	.....	40	10
Mount St. John	.....	39	25
Mount Ripley	7,500	39	08
Mount St. Helena	4,343	38	40
Mount Diablo	3,856	37	50
Mount Tamalpais	2,604	37	53
Mount Hamilton	4,440	37	20
Loma Prieta	4,040	37	08
Gabilan Peak	.....	36	50
Mount Chupadero	.....	36	35
Mount San Bernardino	11,600	34	09

Tamalpais, or Mount Tamalpais, ten miles north of San Francisco, has an elevation of 2,604 feet. The summit can be reached on horseback, and commands a fine view of San Francisco and San Pablo Bays, with many of their tributary valleys, and of the summit of the Sierra Nevada.

Mount St. Helena, ten miles, by the trail, from Calistoga, has an elevation of 4,343 feet, and commands an extensive view, but far inferior to that from Diablo, the adjacent country being less fertile, higher, and mountainous.

Loma Prieta, Mount San Bruno, Mount Hamilton, the Mission Peak, (in the county of San Francisco) Castle Peak, Grizzly Hill, near Grass Valley, Mount Gabilan, and Uncle Sam Mountain, near Clear Lake, all look down on interesting scenes.

§ 111. *San Francisco and Vicinity.*—In many respects the appearance of San Francisco is decidedly unprepossessing to the strange visitor. It stands at the end of a peninsula, much of which is bare, rocky hill and loose sand. We must go twelve miles before we reach any large body of tillable soil. As seen from the deck of a vessel entering the harbor, between July and November, the place looks like desolation and cheerlessness. The streets, the houses, and the hills are brown, and only here and there, at long intervals, do we get a glimpse of a little garden.

But after looking about a week or two, the stranger gets better impressions. The lack of shade trees in the streets and gardens, and even in the public squares, is explained by the coolness of the summer climate, and the general desire to get all possible sunshine on average July days. There is pleasure in thinking of a city to which, and not from which, we wish to flee in the dog-days. And then, as we go to the more fashionable residence streets, we find numerous elegant gardens, luxuriant in a vegetation that could not endure the winter of Washington and St. Louis. The delicate and beautiful European roses, (the Pauline, the Laffay, the Agrippina, the Malmaison, the Perfection, the Saffrano, and a hundred others) the geraniums, the fuchsias, the floripondios, the heliotropes, the verbenas, the laurustinus, and the Australian acacias, give a beauty to our gardens not to be found in any of the larger Eastern American cities. The external architecture of our dwellings, too, is more graceful, the wooden material allowing a liberal use of ornament at little expense. Although the buildings on our main business streets are not so high as at the East, still, in general appearance, Montgomery and Kearny will compare favorably with the most fashionable streets of the Eastern cities generally, and can surpass anything outside of New York and Chicago.

But to see the most attractive features of San Francisco, we must look not at the city herself, but at her surroundings and suburbs. In these she is unsurpassed. She stands upon the shore of a magnificent bay, which attracted the admiration and the praise of every navigator who visited it, even before it had attained any commercial importance. The bay is skirted by fertile plains several miles wide, beyond which rise mountain ridges from two to three thousand feet high. A spur runs through the city, within ten minutes' walk from the Merchants' Exchange, and has various peaks three hundred feet high; and also within the city limits, but three miles from the City Hall, are the Mission Peaks, with an elevation of eight hundred feet. Eight miles further south is Mount San Bruno, twelve hundred feet high; fifteen miles to the northward, beyond the Golden Gate, is Tamalpais, twenty-six hundred feet high; thirty-five miles to the eastward Mount Diablo, three thousand eight hundred and seventy-six feet high, and fifty-five miles to the southward Mount Hamilton, six hundred feet higher yet. These are the corner ornaments to the mountain framing of our landscape. Diablo and Tamalpais are very beautiful mountains, and the former is as high as Vesuvius.

The bay has a fine contour, and romantic shores. Goat Island, Angel Island, Seal Rock, and Alcatraz, add much to the landscape. The steep sides of the last, and its position, just inside the entrance, and near the middle of the channel, fit it admirably for the impregnable fortress of a great harbor. Its casements and barbette batteries suggest defiance, even to those who have no technical knowledge to assist them in understanding the full military value of the place. The Golden Gate is the impressive name of the strait, a mile wide, guarded on each side by high rocky bluffs, leading into the chain of bays, with an area of 350 square miles. It is appropriate, too, for through it have passed $1,000,000,000 to stimulate commerce and industry and to enrich the world.

But six miles from our anchorage lies the Pacific, the vast ocean which covers more than a third of the surface of the globe, and is the open road of our commerce with four continents. Its name, too, is appropriate here, for it is never vexed by hurricanes or cyclones on this Coast. Yet its surf is always grand, and the beach extending southward five miles from Point Lobos is unsurpassed in beauty, and the road to it past (after going through) Lone Mountain Cemetery and back by the Ocean House over the mountain, with a chance to look down on the city and bay, completes a round of scenery which no other city can surpass. The new park has a fine drive, and Woodward's Garden offers to visitors attractions not to be equaled in some important respects by the costly and extensive park of the Eastern metropolis.

Oakland, a suburb of San Francisco, a city of homes for our business men, is embowered in a grove of indigenous evergreen oaks, and abounds with spacious gardens filled with the most luxuriant, varied, and handsome vegetation that our climate will tolerate. We have seen many towns, renowned for beauty, but we have yet to see one that deserves to be placed alongside of Oakland. At Berkeley, a few miles distant, we find ourselves in the midst of a landscape attractive without help from art, and promising to be enchanting, after the landscape gardener and the architect shall have placed a few years of labor on it. In Hayes Cañon and Moraga Valley, east of Oakland, and at Saucelito, we find romantic nooks as wild in vegetation as if there were no city within a hundred miles. The variety and fullness of natural scenery, which people elsewhere must travel for weeks to see, we have here collected within a narrow space, which the land, the sea, and the sky have conspired to bless with peculiar favor.

§ 112. *Geysers.*—The Geysers, in the northern part of Sonoma County, are among the wonders of the State. They are in a deep and steep ravine, amid a district filled with the marks of violent volcanic action. Down the western slope of the mountains which separate Clear Lake from the basin of Russian River, runs a stream called the Pluton River; and near this, at an elevation of seventeen hundred feet above the sea, are the Geysers, a multitude of springs, boiling with heat, and emitting large quantities of steam, with a hissing, roaring, and sputtering noise. Near them are many tepid and cold springs, which add to the wonderful character of the place. Hot and cold springs, quiet and boiling springs, are found within a few feet of each other. And then the waters differ as much in taste, odor, and color, as in temperature and action. One is almost as fetid at times as rotten eggs; another has black water, resembling ink; a third is called the "Eye-water Spring," and its waters are reputed to be excellent for curing sore eyes and cutaneous diseases; and the waters of others are strongly purgative. The ground in the ravine is in places deeply covered with the minerals deposited by the springs; among these, sulphur, sulphate of magnesia, (Epsom salts) sulphate of aluminum, (alum) and various salts of iron, predominate. The chief feature of the Geysers is called "The Steampipe," an orifice about eight inches in diameter, in the hill-side, from which rises a large volume of steam to a height varying from fifty to two hundred feet. The steam roars continuously, sometimes bursting out in puffs louder than that made by an engine's escape-pipe. It deposits flowers of sulphur on the objects which come within its range. "The Devil's Punch-Bowl," called also "The Witches' Cauldron," is in a large hole, six feet across, in the hill-side. The liquid in the bowl is black and thick, and is always in commotion with the heat, and the vapor from it deposits black flowers of sulphur on the rocks around. The sides of the cañon are bare, and smoking with heat. The Geysers are a favorite place of resort for pleasure-seekers, being conveniently accessible, part of the route from San Francisco going through either Napa, Petaluma, or Russian Valleys by rail, and the remainder by stage over a romantic wagon road.

§ 113. *Petrified Forest.*—Five miles west of Calistoga, in the ridge which separates Napa from Santa Rosa, are a score of petrified tree-trunks, lying down, and these have been called the "Petrified Forest," a name which might mislead persons to imagine that the number of petrified trees was large, and that they were standing erect. They are scattered over an area five hundred yards square, and others are found at intervals, on the ridge, down nearly to the bay, a distance of twenty-five miles. The largest is five feet in diameter and about fifteen feet long, with nothing to indicate what became of the remainder of the tree. No branches have been found, nor more than twenty feet of the trunk of any one tree. The smallest trunk is over a foot in diameter, and most of them over two feet, but many fragments are found, broken from trunks of unknown size. The petrifaction is complete. The woody fiber has entirely disappeared, and has been replaced by a grayish stone that seems to be mainly carbonate of lime, in which the grain of the timber is distinctly preserved. The petrifactions split readily with the grain, and the numerous splinters lying about resemble wood rather than stone, until they are picked up.

All the stone trunks are broken across transversely, some of them in pieces not more than a foot long, on an average, with a squarenesss of fracture suggesting that after petrifaction they must have been thrown down. No other explanation will account for the fact that all have numerous transverse breaks, cutting squarely across the trunks, with no appearance of having been crushed. No timber could possibly be broken in such a manner: the breaks must have occurred in the stony condition.

The rock of the ridge is a volcanic sandstone, and was formed by the solidification of wet sand thrown up by a volcano, or washed down from its sides. Such a flood of volcanic sand filled up an ancient forest, to a depth of twenty feet or more; the trees rotted away; those parts above the surface of the sand disappeared; those parts below the surface were replaced by stone deposited in water which trickled down; this petrifaction was harder than the surrounding sandstone, which was washed away; the petrified trunks, left without support, fell down and were broken into numerous fragments, and there they continue to lie, and to tell of wonderful events that happened thousands of years ago.

The trees were redwood, of the species which still grows in the same vicinity.

Another petrified forest, similar to that near Calistoga, is found in the valley of Cedar Creek, in the northeastern corner of the State.

§ 114. *Waterfalls.*—Besides the cascades of the Yosemite and Hetchhetchy valleys, there are a number of others in the State. There is a cataract, about five hundred feet high, on Fall River, which empties into the Middle Fork of Feather River; one of three hundred and eighty feet, where the South Fork of the American River slides down over a convex rock, looking like a streak of snow when seen from a distance; one of sixty feet, in the San Antonio River, in Calaveras County; another of seventy-five, on the same stream, which falls fourteen hundred feet within a mile; and one of three hundred feet, called the "Riffle-box Falls," in Deer Creek, Nevada County.

§ 115. *Natural Bridges.*—California has five natural bridges. The largest of these is on a small creek emptying into the Hay Fork of the Trinity River, where a ledge of rock three hundred feet wide crosses the valley. Under this rock runs the creek, through an arch twenty feet high by eighty feet across. The rock above the arch is one hundred and fifty feet deep. On Lost River, in Siskiyou County, there are two natural bridges, about thirty feet apart. The rock is a conglomerate sandstone, and each is from ten to fifteen feet wide, and the distance across the stream is about eighty feet. One of these bridges is used regularly by travelers. On Coyote Creek, in Tuolumne County, ten miles northward from Sonora, are two natural bridges, half a mile apart. The upper bridge is two hundred and eighty-five feet long with the course of the water, and thirty-six feet high, with the rock thirty feet deep over the water. The lower bridge is similar in size and height to the other.

§ 116. *Caves.*—There are a number of caves in California. Of these, the most noted are the Alabaster Cave, seven miles from Auburn, in Placer County; the Bower Cave, twelve miles from Coulterville, in Mariposa County; the Cave of Skulls, in Calaveras County; and the Santa Cruz Cave, two miles from the town of Santa Cruz. The Alabaster Cave has two chambers: one about one hundred feet long by twenty-five wide; the other two hundred feet long by one hundred wide. It contains a large number of brilliant stalactites and stalagmites. The Bower Cave has a chamber one hundred feet long by ninety wide; it is reached by an entrance seventy feet long, and in one place only four feet wide. The Santa Cruz Cave has no beauty to render it attractive. The Cave of Skulls is remarkable for having contained, when first discovered, a number of human skulls and bones, all covered with layers of carbonate or sulphate of lime, from the thickness of a leaf to an inch. These bones are now in the cabinet of the Smithsonian Institute. At Cave City, and seven miles from Murphy's, in

Calaveras County, is a cave in which a Know-Nothing lodge was accustomed to meet in 1855. In the bluff bank of the Middle Fork of the Cosumnes River, eighty feet above the stream, is a cavern called Limestone Cave, with many intricate passages and some fine stalactites.

§ 117. *Mirage.*—Among the most remarkable scenes witnessed in California are the illusions of the mirage, seen frequently in the deserts of the Colorado and the Great Basin, and sometimes as far north as San Francisco. "All the phenomena of mirage," says Professor W. P. Blake, "are exhibited on a grand scale upon the Colorado Desert. Mountain ranges, so far distant as to be below the horizon, are made to rise into view in distorted and changing outlines. Inverted images of smaller objects, and apparent lakes of clear water, are often seen, and invite the traveler to turn aside for refreshment. The first exhibition of a mirage that was seen [by Blake's party] was from the margin of the plain at Carriso Creek, looking toward the Gila, about ninety miles distant. It was early in the morning, and the eastern sky had that golden hue which precedes the rising sun. Tall blue columns, and the spires of churches, and overhanging precipices, seemed to stand upon the verge of the plain. Their outlines were changing gradually, and, as the sun rose higher, they were slowly dissipated. After reaching Fort Yuma, and witnessing the strangely precipitous and pinnacled outline of the mountains beyond, it was at once apparent that the mirage consisted of their distorted images. When we were upon the northern part of the desert, the peak of Signal Mountain was often distorted and raised above the horizon. The points of distant ranges also seemed at times to be elevated above the surface, precisely as the headlands of a coast sometimes appear to rise above the water at sea."

One morning in the last week of March, 1871, the people of Santa Cruz looking southward towards Monterey, which is twenty-two miles distant, and usually invisible, saw the town in the air, with its houses and shipping. The picture was clearly distinguishable for several hours, but repeatedly changed with the clouds, the objects reflected being often magnified and distorted. Beautiful mirage pictures have on rare occasions been seen at San Francisco.

§ 118. *Mud-Volcanoes.*—In the Colorado Desert, about latitude 33° 25′, and longitude 115° 45′, are some remarkable mud-volcanoes. They are in that part of the desert below the level of the sea; and if the water of the ocean were turned in upon that low land, they would be lost to sight. As it is now, they are very rarely visited, because they are in a region so desolate, that an excursion to them is accompanied by serious hardships. The volcanoes cover a space of a quarter of a mile long, and an eighth of a mile wide; this area is of soft mud, through which hot water and steam are constantly escaping. The noise can be heard at a distance of ten miles, and the steam is visible at a greater distance. The quantity of water thrown up is small; that of the steam, great. The vapor rises steadily in some places, with a hissing noise; in other places, it bursts out with the noise and action of an explosion, throwing the mud a hundred feet into the air, with a loud report.

There are places where the mud is in constant movement, and rises in great bubbles, and bursts, as if boiling with intense heat; while in other places, regular cones, apparently hardened into permanency, and with shapes varying from low hillocks to sharp points, have been formed. There are boiling springs, which throw up their water twenty or thirty feet; and there are large basins, one hundred feet across, and five or six feet below the general surface, in which a bluish paste is continually boiling. Some of the springs are surrounded by incrustations and arborescent concretions of carbonate of lime; others are encircled by deposits of sulphur. The air blown from the *salses* is fetid with sulphur. It is very dangerous to approach the springs and cauldrons, because the whole earth is soft in the vicinity of them, and frequently the crust is broken and thrown up with great force, to establish new springs, steam-vents, and mud-cauldrons; and the boiling slime or water thrown up on these occasions would suffice to kill a man in a few seconds.

In the northeastern part of Plumas County are many hot springs—perhaps numbering one thousand—covering an area of ten acres. They roar and hiss so as to be heard at a distance of a mile, and their steam can be seen from a greater distance. The whole place smells strongly of sulphur, which mineral, as well as alum and various earthy salts, abounds in the soil about the springs.

In four or five places in California, the earth is constantly hot, and sulphurous gases and vapors are constantly escaping. There is such a solfatara about fifteen miles eastward from Santa Barbara; another near Owen's Lake; another near the Geysers, in Sonoma; and another near the hot springs, in Plumas County.

CHAPTER VI.

COMMERCE.

§ 119. *Situation.*—The commercial situation of California is excellent. It is in the southern half of the north temperate zone, in the midst of the western coast of a large and rich continent, at one end of the middle Pacific Railroad, on all the lines of circumterraneous steam communication now in operation, and on the shortest and most comfortable line that can be built to connect the main centers of wealth, population, industry, and intelligence in Europe, Asia, and North America. It possesses the best site for a commercial center between Cape Flattery and Cape Horn, and it has the greatest accumulation of capital, the largest body of people familiar with the most profitable branches of trade and industry, and the best system of rail communication.

The foreign commerce of California, and the greater part of its commerce with the Atlantic States, is conducted by San Francisco. The Golden Gate on the sea side, and the Donner Pass on the land side, are the doors through which the trade and travel entering and leaving the State must go. It might be difficult, if not impossible, to find another country so extensive, possessing only one importing point on a sea coast more than a thousand miles long, and only one notable importing road on an inland boundary fifteen hundred miles long. Oregon and Arizona send travelers, but no freight; and Humboldt and Santa Cruz sometimes send away lumber, but (except a cargo or two of nitrate of potash received at the latter point) have received no imports.

§ 120. *Volume of Business.*—The commerce of California is exceptionally active. No country of Europe, and no other State in the New World, consumes so large a proportion of foreign merchandise, or exports so much, relatively, of its agricultural and mineral products to foreign lands. The sum of the annual exports ranges from $65,000,000 to $75,000,000, and the cost of imports is the same. The value of the imports from foreign countries is about $20,000,000, and that from other portions of the United States, about $30,000,000; the freights and charges on imports are $5,000,000, the duties exacted by the Federal Government, $8,000,000; and a considerable sum is paid as interest on borrowed capital, and as expenses of Californians traveling abroad.

Among our exports are $20,000,000 of treasure, the produce of our States and Territories; and the total annual product of California for exportation, is from $45,000,000 to $55,000,000, or about $85 to the person; whereas $20 to the person is a large sum in other States.

The Pacific Slope of the United States has 1,292,000 square miles, a present population of 831,059, and a coast line of 12,000 miles, whereas the coast line of our country on the Atlantic side, is 4,000 miles. A large part of the area of the Pacific side of our country is composed of desert, barren mountain, and Arctic snow fields, but there is a fertile area of not less than 300,000 square miles, with a capacity to maintain a population of 50,000,000 people.

San Francisco, in the amount of its foreign importations, is the fourth city in the Union, being inferior to New York, Boston, and Baltimore, and superior to Philadelphia and New Orleans.

Before 1868, San Francisco supplied all the exports of the State, save a few cargoes of lumber from Humboldt Bay and Santa Cruz; about two-fifths of the wheat is now loaded at Oakland and Vallejo.

Among the exports of 1873, were wheat and flour, twenty-one millions; wool, seven and three-quarters; wines, one;

ores, one and three-quarters; leather, two-thirds; salmon, a quarter; quicksilver, four-fifths; lumber, a third of a million; and hides, bones, horns, brooms, abelone shells, barley, fruit, mustard seeds, and furs, in smaller amounts.

Among our imports we pay four millions annually for sugar; one and a half for coffee; four for other provisions; making nine and a half millions for provisions alone. Then we have three for coal; one for nails; and as much for iron, in pigs and bars; tobacco and kerosene each demands one; clothing requires twelve; miscellaneous dry goods, six; hardware, four; machinery and agricultural implements, three; boots, one and a half; drugs, one; jewelry, two; tableware, two; and several millions must be allowed for sundries.

§ 121. *Shipping.*—The vessels which entered the harbor of San Francisco, from the sea, in 1872, numbered 3,670, and measured 1,237,000 tons, an average of 330 tons each. The coasters, (vessels from American ports on the Pacific) measured 634,000 tons; the vessels from foreign ports, 505,000 tons; and those from American ports on the Atlantic, 96,000. In 1860, the coasters measured 205,000 tons, and the foreign ships, 199,000; showing an increase of two hundred per cent. in the former, and 150 in the latter, in thirteen years; while the American Atlantic ships, in 1860, measured 129,000, showing a decrease of 30 per cent. The coasters numbered 2,972, and averaged about 200 tons each. The American ports on the Atlantic sent us 86 ships, including 70 from New York, 7 from Boston, and five from Baltimore. Europe sent us 88, including 72 from Great Britain, and 8 each from Germany and France. Australia sent us 77; China and Japan, 80; the East Indies, 38; South America, 122; and Polynesia, 68. The American ports on the Atlantic do not occupy a very prominent place in our seaward commerce.

§ 122. *Currency.*—The currency of all branches of commerce and industry, and of the State and County Treasuries in California, is gold. Treasury notes are used for paying internal revenue taxes, and for a few other purposes, but are treated as merchandise, and are quoted in the market reports at a discount. Some over-wise people have told us that the State has been greatly injured by adherence to a gold currency, and their chief reason is that men are unwilling to move from the Eastern States to California if they must give $10,000 of their money for $9,000 or $8,500 of ours. This would imply that California should sacrifice ten or fifteen per cent. of her property as a condition of exchanging a perfectly safe and stable currency for unsafe and unstable greenbacks. Assertions have been made that the gold standard has been retained here because of the influence of a small ring of capitalists in San Francisco, but such a statement needs no refutation among men familiar with business. Every contract is made independently, and the currency is usually gold, because everybody finds it preferable.

The coin consists chiefly of the double-eagle, or piece of $20. The coinage of the San Francisco Mint, in 1872, was $16,380,000, including $15,600,000 in double-eagles; $300,000 in eagles, half-eagles, and quarter-eagles; $29,000 in half-dollars, $26,000 in quarter-dollars, $19,000 in dimes, and $3,600 in half-dimes. These figures may be accepted as fair annual averages. The silver coinage is only two per cent. of the whole sum, and the amount of half dollars, the largest silver coin in common use, is more than three times as great as that of all the smaller coins together; while the average of double-eagles is fifty times greater than that of all the smaller gold pieces. For payments of twenty dollars, or more, the double-eagles are generally used. No copper or nickel money is coined or current, and half-dimes, the smallest coins, are not very common.

§ 123. *Wealth of the State.*—According to the State assessment, which purports to be made at the cash value, the taxable property in the State amounted, in 1873, to $527,000,000, including $212,000,000 in San Francisco, $25,000,000 in Alameda, $27,000,000 in Santa Clara, $20,000,000 in Sacramento, $18,000,000 in San Joaquin, $16,000,000 in Sonoma, and $11,000,000 in Monterey; $9,000,000 each in Los Angeles, Solano, and San Mateo, $8,000,000 in Marin and Yolo, and smaller sums in the other counties.

Alameda, San Mateo, and Marin owe their valuations, to a great extent, to their position as present or prospective suburbs of San Francisco; and the city with its suburbs contains more than half the taxable property of the State. But in addition to their possessions in and near the city, the inhabitants and business men of San Francisco own large tracts of land, many mines, saw-mills, irrigating and mining ditches, gas and water works, elsewhere, and the total value of their property is not less than $400,000,000.

The banking capital of the State in 1873 amounted to about $80,000,000, including $45,000,000 in savings banks in San Francisco, and $9,000,000 in savings banks in interior towns. The savings banks make long loans—mostly of a year or more, secured by mortgage at rates varying from nine to twelve per cent. per annum. The insurance companies also loan their money on mortgage. The commercial banks obtain from one to one and a half per cent. per month, for one or two months, on promissory notes secured by endorsement, or by the pledge of collateral securities, among which mining stocks occupy a prominent place.

The dividends paid in San Francisco by incorporated companies in 1873, amounted to $20,000,000, including $13,300,000 by mining companies, $3,700,000 by savings banks, $1,000,000 by commercial banks, $480,000 by the water company, $410,000 by the gas company, and $227,000 by insurance companies.

§ 124. *Mining Stocks.*—The stock market in San Francisco is very active, and owes much of its profit to the silver mines of Nevada. The sales of mining shares, in one board of brokers, amounted to $146,000,000 in 1873, $189,000,000 in 1872, $129,000,000 in 1871, $51,000,000 in 1870, and $69,000,000 in 1869.

The gross market value of shares in the mines of the Comstock Lode has ranged from $15,000,000 to $80,000,000, and the change from the lower to the upper limit has sometimes occurred within a few months, making an intense excitement in business. Thus, in the beginning of January, 1872, the shares of the thirteen leading mines of the Comstock Lode were selling at rates indicating that the entire value of these mines was $17,000,000, and five months later they were selling at the rate of $81,000,000. The shares of the Crown Point mine were sold in May at $1,450 each, and as there are 12,000 shares, the whole mine was then valued at $17,000,000. The Belcher, at the same time, was held at $16,000,000. Before the end of summer, the $80,000,000 had fallen back to $30,000,000, indicating a loss of $50,000,000 to the people who did not sell when the prices were at the highest. This was the most remarkable stock excitement in the history of San Francisco; but a fall of twenty-five per cent. in the market value of a mine, within a week, is common. One hundred and fifty different mines are on the stock list, including fifty on the Comstock Lode, sixty more in other parts of Nevada, eighteen in California, eight in Idaho, and two in Utah. The gross amount of the sales is seldom less than $1,000,000, and once exceeded $10,000,000 in a week. It is evident, that with such sales and such fluctuations, many fortunes must be lost and won every year.

The fluctuations become credible when we consider the amounts of dividends and assessments paid within twelve years in a city that has now 180,000 inhabitants. The Bullion Company has paid $1,700,000 of assessments, the Overman $900,000, the Consolidated Virginia $200,000, the Segregated Belcher $200,000, and eight others $658,000, making $3,600,000 in all by twelve companies, not one of which has ever paid a dividend. The Yellow Jacket has paid $1,500,000, the Ophir $1,200,000, the Hale & Norcross and the Gould & Curry each $800,000, and the Crown Point and Belcher each $600,000 of assessments; but all these have paid more dividends than assessments—in some cases several millions more. The total amount of assessments paid by the Comstock mining companies has been $14,000,000, and dividends $35,000,000, leaving a nice surplus on the profit side.

Mining is an uncertain business, and mines, when managed in the most competent manner, rapidly change in value. The opening, or the unexpected exhaustion of a rich body of ore, may give or take away great value within a few weeks. But the stock market in San Francisco is not governed, though it is influenced, by the condition of the mines. The prices are determined, to a great extent, by folly and dishonesty. Out of the one hundred and fifty mines on the stock list, not ten are now paying dividends, and four-fifths, though worked for years, have never paid a dividend. Yet any one of these unprofitable mines may strike a rich body of ore; and so long as they continue to work, the officers circulate encouraging reports, and the stock fluctuates in market price. If a body of ore be struck, the fact of the discovery may be concealed, or its nature misrepresented, for the purpose of defrauding the shareholders, by inducing them to buy or sell. The superintendent holds his place at the mercy of the trustees, and they often require him to inform them privately of any change in the mine several days before it is announced publicly, so they can make something. If he has a rich body of ore, he manages to pay very large dividends for several months, and asserts that he can continue them for a long time, and then the stock goes up; or he keeps his men out of the good ore, and sends poor stuff to mill, so that an assessment is levied, and then the stock goes down. In either case, the outsiders are swindled. These are only a few of the numerous tricks common among the mining sharps, and he who deals with them, does so with greater risk and with less chance of fair dealing than when he sits down at the faro table.

§ 125. *Large Estates.*—The following is a list of the landed estates of more than 100,000 acres each, (some of them are scattered tracts) in California, viz: Miller & Lux, 228,000 acres; the Philadelphia and California Petroleum Company, 160,000; Mary E. Beale, 173,000; Charles McLaughlin, 141,000; I. Friedlander, 125,000; Los Angeles Land Company, 101,000.

In San Diego County, John Forster has 88,000 acres; and Miguel Pedroreno, 47,000; in Los Angeles, the L. A. Land Company, 101,000; Irvine, Flint & Co., 77,000; Pioche & Bayerque, 69,000; E. de Celis, 56,000; Beale & Baker, 53,000; James Lick, 51,000. In San Bernardino, the San Jacinto Tin Mining Company, 48,000; Alfred Robinson, trustee, 42,000. In Santa Barbara, the Philadelphia and Petroleum Land Company, 131,000; Dibblee & Hollister, 97,000; A. P. Moore, 63,000; Santa Cruz Island Company, 53,000; H. & W. Pierce, 53,000; J. W. Moore, 48,000; L. T. Barton, 47,000; E. Conway, 42,000; Hollister & Cooper, 41,000. In San Luis Obispo, P. W. Murphy, 54,000; and F. Steele, 44,000. In Monterey, the estate of Arques, 71,000; J. D. Carr, 47,000; and Miller & Lux, 41,000. In Alameda, Charles McLaughlin, 60,000. In San Joaquin, the Tide Land Reclamation Company, 77,000; Charles McLaughlin, 54,000. In Kern, Mary E. Beale, 173,000; Chapman, Jansen & Roebing, 75,000; A. Weill, 48,000; and J. H. Redington, 45,000. In Fresno, the San Joaquin Valley Land Association, 79,000; I. Friedlander, 62,000; E. Applegarth, 49,000; J. W. Pedree, 47,000; W. C. Ralston, 44,000; and E. St. John & Co., 42,000. In Merced, Miller & Lux, 166,000; C. Paige, 60,000; and J. W. Mitchell, 42,000. In Mariposa, the Mariposa Land and Mining Company, 44,000. In Sacramento, Lloyd Tevis, 43,000; in Colusa, the California and Oregon Railroad Company, 61,000; and in Mendocino, Throckmorton & McKinstry, 83,000. The number of these estates over 40,000 acres is forty-four, in the State, so far as reported; the number between 30,000 and 40,000 acres is twenty-three; those between 20,000 and 30,000, are fifty-five; those between 10,000 and 20,000 acres are one hundred and forty-eight; and those between 5,000 and 10,000 acres, two hundred and thirty-eight. The entire number of these estates of more than 5,000 acres each, is four hundred and fifty-three. Most of them are held under Mexican grants, and probably one-third or one-fourth under purchase from the American government. Several railroad companies, which own large tracts, do not appear in the list.

§ 126. *Railroads.*—The following is a list of the railroads completed in California.

The (original) Central Pacific, from Sacramento to Ogden, 748 miles.

The original Western Pacific, now consolidated with the Central Pacific, from Oakland to Sacramento, 135 miles; and from Niles' to San José, 18 miles.

The original Oakland City Railroad, now consolidated with the Central Pacific, from Oakland to Brooklyn, 5 miles.

The original San Joaquin Valley Railroad, now consolidated with the Central Pacific, from Lathrop to Goshen, 146 miles.

The original California and Oregon Railroad, now consolidated with the Central Pacific, from Junction (now Roseville) to Redding, 152 miles.

The original Alameda Valley Railroad, now consolidated with the Central Pacific, from Alameda to Hayward, 11 miles.

The main line of the Central Pacific, from Oakland to Ogden, is 878 miles, and there are 337 miles of branches; and including three miles of ferry between Oakland and San Francisco, and five miles between Alameda and San Francisco, the total length of the routes of the Central Pacific is 1,226 miles. On the main line of the Central Pacific, from Oakland to the State line, there are 275 miles in California.

The California Pacific Road, from Vallejo to Sacramento, 60 miles.

The Napa branch of the California Pacific Railroad, from Napa Junction to Calistoga, 35 miles.

The Marysville branch of the California Pacific Railroad, from Davisville to Marysville, 44 miles; but of this distance, 20 miles is not now in running order.

The Los Angeles and Wilmington Railroad is 21 miles long.

The San Francisco and North Pacific Railroad Company have a railroad 56 miles long, connecting Donahue with Cloverdale.

The Stockton and Copperopolis and Visalia Company have a railroad of 30 miles, from Stockton to Milton, and another of 19 miles, from Peters to Oakdale.

The Southern Pacific Railroad Company have a railroad 94 miles, from San Francisco to Hollister; a branch railroad from Carnadero to Salinas, 38 miles; a railroad from Goshen to Delano, 50; and 50 miles from San Fernando to Rubottom.

The Sacramento Valley Railroad, from Sacramento to Shingle Springs, is 49 miles long.

The railroad routes above given, aggregating 1,671 miles, are under the control of the gentlemen who compose the Central Pacific Railroad Company. Of the Central Pacific main line, 605 miles are in Nevada and Utah, leaving 1,036 miles of its main road and branches in California, now completed.

The Northern California Railroad, from Marysville to Oroville, is 26 miles long.

The Pittsburg and Black Diamond Railroad, connecting the Monte Diablo coal mines with Antioch, is 7 miles long.

The San Rafael and San Quentin Railroad is 3½ miles long.

The total length of the steam railroads in California is 1,165½ miles.

The San Francisco and North Pacific Coast Railroad Company is now constructing a railroad with a gauge of three feet, to run from Saucelito to Bodega, by way of San Rafael, and promises to have the cars running to San Rafael before midsummer of 1874.

The Southern Pacific Railroad Company has promised to build twenty-five miles of railroad, from Los Angeles to Anaheim, within two years, and has commenced the work.

Congress has given 12,800 acres per mile, for a continuous railroad from Sacramento to Portland, and 170 miles of the road in California, and 203 in Oregon, are in running order, leaving a gap of 209 miles unfinished between Redding and Roseburg. Short as is the gap, and valuable as are the roads in the Sacramento and Willamette Valleys, with considerable bodies of rich land in the Klamath and Rogue Valleys, yet the progress of the work is very slow, and fears are entertained that the connection will not be completed for some years. The work is entrusted to two companies, one in Oregon and one in California, and each is required to finish twenty miles every year, and to reach the line before 1876.

Congress has granted to the Texas and Pacific Railroad, 12,800 acres per mile along its route in California, and 25,000 acres per mile in Arizona and New Mexico. In Texas the land is the property of the State, and the Legislature has given a large quantity, enough, it is said, to secure the completion of the road from Marshall to the western border. The distance from San Diego to Galveston is 1,500 miles, whereas that from San Francisco to New York, by the Middle Pacific, is 3,300. But from San Francisco to New York by way of San Diego and Marshall, the distance is 3,600 miles. The grades on the Texas and Pacific are better than on the Middle Pacific, and there is no danger of snow. An Act of Congress, passed on the 2d of May, 1872, provides that not less than one hundred miles must be built annually, from Marshall westward, and not less than ten miles before the 2d of May, 1874, and after that twenty-five miles a year from San Diego eastward, and that the whole road shall be finished before the 2d of May, 1882. Congress has granted to the Atlantic and Pacific Railroad Company a subsidy of 25,600 acres per mile, for a railroad from the southern line of Missouri to Fort Mojave on the Colorado River, and 12,800 acres per mile for the extension of the road from that point to some convenient point on the Pacific ocean. A subsidy of 12,800 acres per mile has also been given to the Southern Pacific Railroad Company of California for a branch road to run from San José, to connect at Fort Mojave with the main road of the Atlantic and Pacific.

§ 127. *Railroad Terminus.*—The question of the main terminus of the railroad system of the State is not yet settled; although five years have elapsed since the cars from the Missouri River began to run regularly to Sacramento. San Francisco, having all the importing business, all the exporting houses, all the first-class wholesale houses, and nearly all the banking and insurance capital of the State, was, so far as the concentration of business and business men could make it, the proper terminus for the road. But it had the serious disadvantage of being cut off from Sacramento—the inland business center of the State—by swamps, mountains, and bays. The distance from Sacramento to San Francisco, in a direct line, is seventy-six miles; to Oakland, by rail through Livermore Pass, 135; to San Francisco, via Livermore Pass and San José (the only rail route to San Francisco) 178 miles; to Oakland, by Stockton, Bantas, and Martinez, (road not yet made) 148; to San Francisco via Bantas, Martinez, Oakland and San José, 248; to San Francisco, via Bantas, Martinez, Oakland, and projected bridge across the bay at Ravenswood, 208 miles.

After the completion of the road to San Francisco, various plans were considered to bring the cars into the city. A bridge across the Bay from Oakland, a bridge across the Bay at Ravenswood, thirty miles to the south, a bridge to Goat Island, which is only a mile and a half from the city, were all proposed, discussed, strenuously opposed on various grounds of public interest, and all have now been given up, or, at least, allowed to drop, as if finally abandoned. It is generally admitted that the cars cannot be brought into San Francisco with a profit, by rail, but they may be brought across the Bay in large ferry-boats; and one has been built to carry twenty cars at a load, and it is supposed that this may accommodate the business. If, however, it be necessary, for heavy freight, that the cars should meet the ships at deep water, without the intervention of a ferry-boat, then an important rail terminus may be either at Oakland, (after an artificial harbor shall be made there) at Vallejo, where nature has provided a good harbor, a good upland site for a city, and good water front for more than half a mile, at Benicia, at Martinez, or Saucelito. The last place has many advantages of position, but its site is composed of high, steep hills. Oakland is 144 miles from Sacramento, by Stockton, Bantas, and Martinez, the level route; and Vallejo is 60 miles in distance, and ten miles more by difficulty of grade (having an elevation of 200 feet to pass) from Sacramento. Freight can be carried from Sacramento to the ship at Vallejo for one-half the price to Oakland. Saucelito might be reached from Vallejo by a road thirty miles long, but there is no present probability of its construction. The completion of the railroad from Bantas, by way of Martinez, to Oakland, would make a concentration of channels of communication at Carquinez Straits, or the Silver Gate of California, requiring every car or ship, going and coming between the great Sacramento-San Joaquin Basin and the sea, to pass that point.

§ 128. *Ocean Steamers.*—All the ocean steamers of California ply from San Francisco. The following is a brief schedule of their routes and times of departure:

Twice a month for Panama; there connecting by the Isthmus Railroad with New York, and touching on the Pacific side, on her southward course, at San Diego, Mazatlan, Manzanillo, and Acapulco. At the last-named port, one steamer each month connects with a branch steamer for various Central American ports.

Twice every month for Yokohama, connecting there with a branch steamer for Hong Kong, touching at Hiogo and Nagasaki by the way.

Once a month for Honolulu.

Once a month for Guaymas, touching at Magdalena Bay, Cape San Lucas, La Paz, and Mazatlan.

Twice a month for Victoria, connecting there with steamers for Puget Sound.

Once a week for Portland, connecting there with steamers for Puget Sound and Sitka.

At intervals of five days, for San Diego, touching at Santa Barbara and San Pedro.

At intervals of ten days, for Santa Barbara, touching at Monterey, San Simeon, and San Luis Obispo.

Once a week for Tomales and Olema.

Once a week for Salinas and Santa Cruz.

Once a week for Hueneme, touching at San Buenaventura.

Once a month for Hong Kong direct, by a British line.

Once a month for Hong Kong direct, by a German line, not yet in full operation.

Once a month to Auckland and Sydney, by a line for which a contract has been made, but not yet established.

The steamers of the Pacific Mail Company, running from San Francisco to Japan, number ten, with 39,000 tons; to Panama, seven, with 19,000 tons; to San Diego, four, with 3,200 tons; to Honolulu, one, with 1,300 tons; and to Guaymas, one, with 800 tons, making twenty-three steamers in all, with 62,300 tons.

§ 129. *Telegraphs.*—The magnetic telegraph connects all the main towns of the Coast, extending from Vancouver Island, through Washington, Oregon, and California, to Tucson, Arizona. West of the main ridge of the Coast Mountains, in California, the wires do not extend northward from San Francisco beyond Cloverdale, but will probably soon be taken on to Humboldt Bay. Two lines connect San Francisco with the Atlantic States. The present charge for ten words from San Francisco to New York is $2.50; to Vallejo or San José, 25 cents; to Sacramento or Stockton, 40 cents; to Visalia, $1; to San Diego, $2.

§ 130. *Harbors.*—San Francisco Bay, one of the finest bays in the world for the purposes of commerce, is about eight miles wide and fifty long, reaching from 37° 10′ to 38°. Its entrance, called the Golden Gate, or Chrysopolis, is a mile wide, between 37° 48′ and 37° 49′. The peninsulas which separate the bay from the ocean, are from six to fifteen miles wide. The water on the bar is thirty feet deep at low water; inside much deeper, with excellent holding-ground, and room for all the shipping of the world.

Connected with this bay, are those of San Pablo and Suisun, lying farther inland, on the course of the outlet of the waters of the Sacramento basin. San Pablo Bay is nearly round, about ten miles in diameter, and lies north of San Francisco Bay, with which it is connected by an unnamed strait, about three miles wide. Suisun Bay, about four miles wide by eight long, lies eastward of San Pablo Bay, with which it is connected by the Strait of Carquinez, which is a mile wide. Both bays are deep, but the water in the strait is only sixteen feet deep at low tide, and large vessels cannot ascend beyond it. Benicia, on the bank of the strait, is the head of navigation for shipping of the largest class, has a large and secure harbor, accessible at low tide for vessels drawing twenty-two feet, and at high water for those drawing twenty-seven. Five miles west of Benicia, Napa River enters San Pablo Bay, making Vallejo Bay, which is 400 yards wide and four miles long, with a depth of 26 feet. Martinez, opposite Benicia, and Oakland, opposite San Francisco, are cut off from deep water by mud flats. At Oakland a wharf has been built out a mile and a half, to reach a point accessible by large vessels.

The Bay of San Diego, twelve miles long, from one to two miles wide, and crescent-shaped, running from the entrance, and then turning to the southeastward, is a magnificent harbor. A channel, thirty feet deep and half a mile wide, extends more than half the length of the Bay, from the entrance. The holding-ground is good; the protection from the winds perfect. There is no difficulty in entering at any time, but it is not safe for sailing vessels to go out during gales from the southeast.

In latitude 34° 38', thirty-five miles southeastward from Los Angeles, is a land-locked estuary, about eight miles long and from half a mile to a mile wide. It has not been surveyed, and its value for commerce is not known; but there has been some talk lately of using it as a port for some of the adjacent towns. The entrance is not more than ten feet deep, and probably not so deep as that.

Of the open harbors, that of Crescent City is the most northern, in latitude 41° 44'. It lies on the southern side of a rocky point that juts out about half a mile in a westward direction, at right angles to the general line of the coast. The harbor is small and shallow, with a bottom of sand and rocks. Vessels drawing twelve feet of water lie nearly half a mile from the shore. The harbor is safe while the wind blows from the north and northwest, but is very dangerous when it blows from the southward. The harbor might be made much more safe by a breakwater, at a cost of one or two millions of dollars.

Trinidad, in 41° 03', is a very small harbor, open to the south, with deep water and excellent holding-ground.

Bodega Bay, in 38° 18', has nine feet of water, and opens to the southward, so that the anchorage is secure only while the wind blows from the north. Tomales Bay, just opposite, opens into the southern part of Bodega Bay, and is only five miles distant from the Bodega anchorage: and, as one is secure against northern and the other against southern winds, vessels are safe in all weathers, because they can easily run across to whichever may prove the sheltered side.

Tomales Bay is fourteen miles long and two miles wide, separated from the ocean by a strip of land a mile and a half wide. Its mouth is in 38° 15′. Its course is southeastward, and it is open to the northwest winds. The water is about twelve feet deep. Tomales Bay is surrounded by hills, and is of little value for commerce.

The Bay of Sir Francis Drake, in latitude 38°, is small, open to the south, and of no value to commerce.

Half-Moon Bay is a small roadstead, eighteen miles south of the Golden Gate.

Santa Cruz Harbor, on the northern side of Monterey Bay, in 36° 57′, is small, has four fathoms of water, a sandy bottom, and is open to the south.

Twelve miles farther south is the mouth of the Salinas River, which is about two hundred yards wide, and has seven feet of water. It is entered by small schooners, with the help of a steam-tug.

Eight miles farther to the southward is the harbor of Monterey, which is large and deep, and has good holding ground. It is open to the north.

San Simeon Harbor, in 35° 38′, has a good anchorage, and is safe while the wind blows from the north; but it offers no protection against storms from the southward. The bottom is sandy.

San Luis Obispo Harbor, in 35° 10′, has a good anchorage, safe at all times, except during storms from the southward.

Santa Barbara, in 34° 24′, has an open harbor, exposed to the south winds. The water is deep, and the bottom hard.

San Pedro, in 33° 43′, is open to the south, but probably might be made secure by a breakwater, to cost one million of dollars. The bottom is hard.

At Wilmington, about five miles east of San Pedro, the construction of a breakwater to provide an artificial harbor has been commenced.

Humboldt Bay is twelve miles long, from two to five miles wide, and is separated from the Pacific by two tongues of land, which are covered by high and dense timber, and offer an excellent protection against the strong winds of the coast. The mouth of the bay, in latitude 40° 44′, is a mile across, but has breakers on each side; and between them is a channel, a quarter of a mile wide, with about eighteen feet of water at low tide. The greater part of the bay is shallow, but there is an abundance of deep water, with good anchorage and perfect safety for shipping. The entrance is considered dangerous, and a steam-tug escorts nearly all sailing-vessels in and out.

The difference between extreme high tide and extreme low tide is about nine feet at Crescent City, eight feet at San Francisco, and seven feet at San Diego. The mean difference between the highest tide and the lowest low tide in one day, at San Francisco, is less than six feet.

George Davidson, of the U. S. Coast Survey, in his *Coast Pilot*, says: "As a general rule there are, upon the Pacific Coast of the United States, one large and one small tide during each day. * * * The corrected establishment, or mean intervals between the moon's transit and the time of high water at Fort Point, San Francisco Bay, is 12 hours, 6 minutes."

§ 131. *Navigable Streams.*—The Sacramento River is navigable for steamers drawing three feet of water, to Sacramento City, and to Red Bluff for boats drawing fifteen inches. The Feather River is navigated by steamers drawing fifteen inches, to Marysville, seventy-five miles from Sacramento; and boats have ascended to Oroville, twenty-five miles farther. Steamers drawing five feet can run regularly to Stockton, on the San Joaquin, a distance of one hundred and thirty miles from San Francisco; and in times of high water, a boat drawing about fifteen inches ascends to Fresno City, one hundred and fifty miles farther. A number of sloughs or tide-water creeks, navigable for small vessels, open into the bays of San Francisco, San Pablo, and Suisun. The most notable of these are the Alviso or Guadalupe slough, at the head of San Francisco

Bay; the San Antonio slough, opposite San Francisco city; the Petaluma, Sonoma, and Napa sloughs, opening into San Pablo Bay; and Suisun and Pacheco sloughs, opening into Suisun Bay.

The navigation of the Colorado is beset by many difficulties. The tide rises 28 feet at the mouth of the river, and sometimes advances with an immense bore or wave, which is dangerous to small vessels. In the lower part of the river the sand-bars are numerous, and they frequently shift their positions. The transportation is done by small tug steamers, drawing about two feet of water, the freight being placed on barges. The boats tie up to the bank in the evening, to avoid the risk of running in the dark. The distances from the mouth of the river, or Victoria Bay, are 150 miles to Fort Yuma, 453 miles to Hardyville, and 543 miles to Callville. The last point is the head of possible navigation, and there the ordinary surface of the stream is 780 feet above the sea, showing an average descent of about a foot and five inches to the mile. Hardyville is the actual head of navigation, and steamers usually take ten days for the trip from the mouth of the river.

The State has at present one navigable canal, built mainly for the purpose of irrigation, but little use is made of it. Several large canals will undoubtedly be constructed within a few years.

§ 132. *Passes.*—The passes on the mountains which fence in the valleys of California are important elements in determining the course which commerce must take. Among the passes in the Coast Range, are the following:

PASSES	ELEVATION.	LATITUDE.	
		deg.	min.
Livermore Pass	686	37	42
Pacheco Pass	....	37	00
Panoche Pass	....	..	..
Cajon de Tenoco Pass	....	34	40
San Francisquito Pass	3,437	34	35

PASSES.	ELEVATION.	LATITUDE.	
		deg.	min.
Williamson's Pass	3,164	34	30
Cajon Pass	4,676	34	10
San Gorgonio Pass	2,808	33	55
Warner's Pass	3,780	33	10
Santa Margarita Pass	1,350	35	20
San Fernando Pass	1,956	34	20

The following are the principal passes in the Sierra Nevada, commencing at the north:

NAME.	ELEVATION.	LATITUDE.	
		deg.	min.
Lassen's Pass	.....	41	50
Fredonyer Pass	.....	40	25
Beckwourth Pass	5,329	39	45
Luba Pass	6,642	39	38
Henness Pass	6,996	39	30
Donner Pass	7,056	39	20
Georgetown Pass	7,119	39	10
Johnson Pass	7,339	38	50
Carson Pass	8,759	38	45
Silver Pass	8,793	38	30
Sonora Pass	10,115	38	10
Mono Pass	10,765	37	55
Slate Pass	12,400	37	28
Whitney Pass	12,057	36	32
Walker Pass	5,302	35	40
Humpayamup Pass	5,356	35	35
Tehachepe Pass	4,020	35	10
Tejon Pass	5,285	35	00
Uvas Pass	4,256	34	50

CHAPTER VII.

MANUFACTURES, ETC.

§ 133. *Coarse Work.* — Among manufactures are here included lumbering, fishing and hunting, brewing, and the distillation of spirits generally; but the making of wine and the distillation of brandy are treated under the head of Agriculture, and the reduction of ores as part of Mining. The manufactures of California are mostly of a coarse class, requiring little labor, relatively, and much raw material, and of classes costing much, relatively, for importation. Our blankets and coarse flannels are of home manufacture, our broadcloths and merinos are imported. We make wrapping, but not letter paper. We have factories to make wine and pickle-bottles, but not plate or cut-glass. Having a large supply of hides, lead, wheat, barley, and grease, we find it cheaper to make our leather, lead-pipe, shot, flour, beer, and soap, than to send the raw material 19,000 miles by sea to the shops in the Atlantic, and pay for manufacture there and for freighting both ways. But our finest leather, our most costly malt liquors, and our most esteemed toilet soaps, come from abroad. Nitric and sulphuric acids, matches, dynamite and blasting powder, are made here, because the freight on them round Cape Horn is very high. Their dangerous character forbids long transportation. We refine our sugar, because we get most of it from the Hawaiian and Philippine Islands. Our wire-rope is produced here, because it must be made to order and delivered promptly; mirrors are silvered here, because the process is simple, and the foreign mirrors are frequently injured in transportation. We produce no manufactures for exportation, and many years may elapse before we supply the finer articles needed for home consumption.

§ 134. *Obstacles.*—The lack of water-power near the metropolis, the high price of transportation, the dearness of fresh water in our large towns, and the high price of land suitable for factory sites near a deep water-front in secure harbors, all tend to increase the difficulties of manufacturing. The high rate of wages, however, is the chief obstacle. This is felt at once, at the very beginning of every enterprise, and is much more oppressive in many branches than all the other obstacles together. The expenses of living are less here than in the Eastern States; and in no city on the Atlantic slope can so much comfort and enjoyment be obtained for the same money as in San Francisco. The extreme heat of summer, the cold of winter, and the diseases which they bring upon the poor, make a great difference against Eastern cities. There is no good reason why labor should not be as cheap here as beyond the Rocky Mountains, except that, on account of the lack of manufactures and of irrigating ditches, there is not sufficient regularity of employment. At favorable seasons the demand for laborers in the mines and farming districts exceeds the supply, and the excessive competition of employers at such times, and the idleness of laborers at others, equally tend to keep up wages.

The interest of the State demands the payment of the highest wages at which the employer can afford to find work for all white applicants; but a rate so high that it prevents the establishment of manufactories, and leaves a considerable part of the people without occupation during three or four months every year, repels immigration, keeps down the value of land, hampers commerce and agriculture, and is one of the most serious misfortunes that can befall a State.

Our agricultural and mining industries have reached advanced development in some branches, while our manufactures are backward. The chief working force of the world is now steam, and the State which relies mainly on its human muscle, as California does, is at a great disadvantage. We not only lose the profit on the steam-engines, and that on the wages of the skilled operatives, but we condemn ourselves to the production of raw material—the most unprofitable of all occupations—pay freight on raw material to Atlantic ports, and on the manufactured articles back, deprive our land-owners of the rent of factories and dwellings for factory laborers, and leave our farmers without a home market. We send our wool, hides, leather, bones, horns, and mustard to distant countries, and receive one-third of them in a manufactured condition—another third going to pay the manufacturers, middlemen, and shippers.

Prominent among the obstacles to the development of our own manufactures, is the lack of cheap coal, iron, and hard wood. The western slope of the continent does not, so far as known, produce any first-rate mineral coal, which is the basis of mechanical power. Such coal as we have in California is not abundant, nor is its extraction very cheap. Iron ore of excellent quality we have, but dear transportation and dear coal prevent the erection of furnaces, and we import all our iron from Atlantic ports. Tough hard wood (such as oak, ash, and hickory, fit for wagons, cars, agricultural implements, and strong casks) is imported from the Eastern States. The unsettled state of society, the insecurity of land titles, and the frequency of land suits, tend to repel capital and keep up the rates of interest, which are so high that manufacturers cannot afford to pay the current rates. Yet, if large manufacturing establishments offered an unexceptionable security, they could probably borrow at the rates slightly in advance of those current in England.

§ 135. *Statistics.*—According to the Federal census, California had, in 1870, 3,984 manufacturing establishments, employing 25,392 persons and $40,000,000 capital, paying out $13,-

000,000 for wages, and $35,000,000 for raw material, and turning out products worth $66,000,000 annually. The wages, raw material, and ten per cent. on the capital invested, added together, make $52,000,000, leaving $14,000,000 as annual profit, above a low rate of interest on the money.

The number of steam engines is 604, with 18,493 horse-power, and of water-wheels, 271, with 6,877 horse-power, or a total of 25,370 horse-power; and, as each of these is equal to ten men, the machine power considerably exceeds that of the adult male residents of the State.

The chief manufactured products are: flour, $8,000,000; lumber, $6,000,000; sugar and machinery, each $4,000,000; quartz gold, $3,400,000; printed work, $2,200,000; cigars, $1,900,000; clothing, $1,800,000; malt liquors, $1,600,000; boots and shoes, $1,500,000; iron castings, $1,300,000; carriages and wagons, $1,300,000; bread and woolen goods, each $1,200,000; and harness, quicksilver, and distilled liquors, each $1,000,000. The quartz mills and quicksilver reduction works do not properly come under the head of manufacturing establishments, and their production is underestimated.

More than half of the manufacturing industry of California is in San Francisco, which produces $37,000,000 out of the $66,000,000 of annual product; pays $20,000,000 out of $35,000,000 for raw material, and $7,000,000 out of $13,000,000 of wages; has $21,000,000 out of $40,000,000 capital, and 1,223 out of 3,984 manufacturing establishments. After San Francisco, in the amount of manufacturing product, are Sacramento, with $4,000,000; Santa Clara, with $2,300,000; Santa Cruz and Amador, each with $1,600,000; Sonoma, with $1,400,000; Yuba and Nevada, each with $1,300,000; Alameda, with $1,100,000; and Mendocino and San Joaquin, each with $1,000,000.

§ 136. *Wages.*—There has been a gradual fall in the wages of labor since 1849. For instance, in that year the wages of good carpenters were sixteen dollars per day; in 1851, ten dollars; in 1853, seven dollars; in 1856, five dollars; and now four dollars; and there has been a similar decrease of wages in all those branches of labor much in demand. Tailors, shoemakers, and cabinet-makers have never received high wages, because little is done in their trades. Millers, caulkers, and shipwrights now get from four to six dollars per day; bricklayers, stone masons, and plasterers, from four to five dollars; boiler-makers, machinists, and pattern-makers, four dollars; carpenters, blacksmiths, and carriage-makers, from three to four dollars; house-painters, paper-hangers, and stevedores, three dollars; hodmen and washerwomen, two dollars; common white laborers, one dollar and seventy-five cents; and Chinamen, from eighty cents to one dollar and a quarter. Of such persons as are hired by the month and boarded, gardeners get thirty-five dollars; farmers, teamsters, waiters, sailors, chambermaids, and seamstresses, twenty-five dollars. Clerks in stores get from thirty to sixty dollars, with boarding; from fifty to one hundred dollars without boarding. The best miners, of the class called "drifters," who cut and blast tunnels and dig shafts, get three or four dollars per day; common miners get fifty dollars a month and boarding.

The policy of fixing wages so high that manufactures of home production cannot compete with those imported, that laborers cannot obtain steady employment, and that immigrants are frightened off by the cry that this is no country for a poor man, is the most pernicious one possible for the State as a whole, and for laborers as a class. Irregularity and uncertainty of employment are the greatest evils that can beset poor men; and inability to furnish employment to poor men, with profit to himself, is one of the most unfortunate conditions for a rich man. The general interest is best promoted when the poor man's labor and the rich man's money are always in active demand at a fair price; and then poor men of intelligence, skill, and credit, will frequently become employers, and by their influence and example keep up a kindly feeling between the two classes.

§ 137. *Navy Yard.*—The only navy yard established by the American Government on the Pacific Coast, is at Mare Island, twenty miles northeastward from San Francisco, and it is destined to occupy a prominent place in the manufacturing industry of California. The site is excellent in nearly every respect, and it will probably become the most important navy yard of the country. The work on the Atlantic side is divided up between seven yards, and not one of them is fitted up properly. The report of the Secretary of the Navy for 1870 contains a report of Admiral Porter, who said: "Mare Island is destined in time of war to be the most important of our dock-yards, and I therefore beg leave to invite your particular attention to it. It is evident that in the future all of our ships in the Pacific will have to depend upon the Mare Island Navy Yard for repairs. The passage around Cape Horn, at the end of a three years' cruise, should not be attempted, and it will be found much more economical to fit out vessels for China, in California, by which they avoid the long passage around the Cape of Good Hope, via Brazil, or the troublesome and expensive one through the Suez Canal. By the Cape of Good Hope route, the passage from New York to Hong Kong cannot be made in less than one hundred and ten days, or by way of the Suez Canal in less than sixty-five days, while the voyage from San Francisco to the same point can be performed in twenty-eight days. This is at once an argument in favor of fitting vessels out at Mare Island for all parts of the Pacific and for the Asiatic coast. The argument holds good also for laying the vessels up there, and they can reach California from the China seas quicker than they can the Eastern coast of America, to say nothing of the wear and tear of the longer voyage, and the anxiety of coming on our stormy coast in the winter, which they will escape. Several of the European powers are making preparations to establish repairing stations in the East, if they have not already done so; while we need not go to such an expense if we provide the facilities for repairing the different vessels at Mare Island."

Our ships in commission—that is, in active duty—are divided into five squadrons. The Pacific, Asiatic, North Atlantic, and European squadrons, are of nearly equal force; while the South Atlantic is of about half the force of either of the others. The vessels are fitted up to cruise for a period of three years. The men are enlisted for that time, and the imperishable ammunition and stores are calculated to last for that period; and as it takes many months for a ship to reach a distant station, if the cruises were shorter, most of the time would be lost in the outward and home voyages. For many years it was customary, on account of lack of supplies and machinery, and the high price of labor at Mare Island, to send the ships of the Pacific and Asiatic squadrons to Atlantic navy yards, to be refitted at the end of every cruise, thus consuming about one year out of three, in a long, uncomfortable, and useless voyage; and most of the Asiatic ships still make that costly trip. All the war ships of the country stationed in the Pacific hemisphere should be refitted at the Pacific Navy Yard, in the opinion of Admiral Porter, and the present Secretary of the Navy; and when the Government acts on that opinion, and puts our navy on an equality, as to strength and efficiency, with that of Great Britain, there will be steady work for years at Mare Island for 10,000 men; whereas the largest number employed heretofore has been 2,000, and they were retained only a short time, the average being from 500 to 1,000.

The Woolwich, Cherbourg, and other navy yards of Great Britain and France, have each more machinery and material than all the American yards put together. The British yards furnish employment to 20,000 artisans in ordinary times, and twice as many in exceptionally busy seasons. The Cherbourg Navy Yard has cost $80,000,000 for permanent improvements; and with the low wages paid in France, that sum represents more than twice as much labor and material as it would in California. The total expenditure for permanent improvements at Mare Island, has been perhaps $1,000,000. There are some dwellings for officers, and buildings for workshops; but instead of having machinery and materials for constructing half a dozen large iron-clads at once, there is not enough of either for the convenient building of a small wooden vessel. In fact, we are almost helpless; and such security as we enjoy on this Coast against aggression is due, not to our strength, but to the pacific disposition or interests of the great naval powers of Europe.

A Board of Government Engineers, in March, 1874, recommended the following permanent improvements, viz: For grading 100,000 cubic yards per annum, 15 years, $500,000; the quay wall, 500 linear feet per annum, $2,500,000; for extension of floating dock basin, and building and repairing ways, 675 feet, to include Ways No. 8, and iron floating dock, $1,750,000; for wood and metal work-shops for yards and docks, $500,000; for carpenter and joiner shops for construction and repair, $300,000; for machine shops, storehouse, and offices, $700,000; for storehouse and office for yards and docks, $250,000; for temporary erecting-shop for steam engineering, $300,000; for sail-loft in store, $300,000; for general store for ordnance, $250,000; for shell-house for ordnance, $250,000; for smithery, $200,000; for machine shop, $500,000; for boiler shop, $250,000; for storehouse, $300,000; or foundry, $250,000; for construction basin complete, $1,500,000. Total for fifteen years' construction estimated at $10,600,000.

§ 138. *Lumbering.*—Lumbering, or the preparation of forest timber for industrial purposes, is an important branch of the industry of the State. Our houses are built of lumber, our streets are planked with lumber, our fields are fenced with lumber, and our flumes and sluices are made of lumber. Some parts of the State are very rich in timber, and can readily supply the whole demand. Lumber is of three kinds, sawn, hewn, and split: the last two kinds being very small in importance as compared with the first. There are 328 saw-mills (205 driven by steam, and 123 by water) in the State, and they saw 260,000,000 feet (board measure) annually. Mendocino saws 70,000,000, Humboldt 40,000,000, Nevada, 35,000,000, Placer 17,000,000, Santa Cruz 14,000,000, and Sonoma and El Dorado each 9,000,000. The coast mills are occupied almost entirely with redwood, and the mountain mills with pine and fir. The mills in Nevada send large quantities of lumber of the State of Nevada and Utah.

The logs cost from $4 to $7 per thousand feet, delivered at the mill; the sawing costs from $3.50 to $4.50, and the freight to San Francisco is not less than $4.50 from Humboldt Bay, or $3 from Mendocino and Sonoma ports, and sometimes 25 or 50 per cent. more. In redwood, from 15 to 35 per cent. is clear, from 40 to 75 per cent. rough, and from 10 to 25 per cent. refuse or broken. In fir, from 10 to 25 per cent. is clear, from 65 to 85 is rough, and from 5 to 10 per cent. is refuse. The refuse clear redwood sells for $10 less than the good clear, and the refuse rough $4 less than the other. There is, besides, a commission on sales, varying from two and a half to five per cent. The average cost to the producer of the lumber, delivered in San Francisco, is not less than $16.

§ 139. *Cod Fishery.*—The fisheries of our Coast are, according to respectable authorities, superior to those of the North Atlantic in the abundance, variety, and quality of the fish; but if there were no superiority in any point, we should still have cause to regret that the natural wealth of our rivers and banks is neglected. We import largely of cod, mackerel, herring, sardines, and anchovies, which abound on our shores; and perhaps sardelles, which we obtain from Germany, might also be found here. The mackerel off the coast of Santa Barbara is small; but a fish very similar to the Atlantic mackerel, and equal in size and flavor, was found near Kodiak by the U. S. Coast Survey last summer. The cod banks of Alaska are more extensive than those of Newfoundland. Halibut can be caught in immense numbers, but they are scarcely disturbed. The curing of salmon is only in its beginnings, while that of herring, smelt, sardines, and anchovies has not yet commenced. The cod fishery is languishing. In 1873 only eleven vessels went to the Alaska banks from California, about one-half as many as had gone in several previous seasons. The causes of the decline, so far as we can learn, are that the men employed are ignorant and careless, the salt impure, and the drying process faulty. Some vessels take the cheapest salt for curing, and its alkalies unite with the fat of the fish to injure its flavor and reduce its weight. Opinions prevail among experts that the process of drying proceeds too fast in our climate, and that the rapidity of desiccation makes the meat hard, and prevents a certain course of chemical changes necessary to excellence. It is said that some of the codfish most in favor with those who claim to be gourmets, are also the most fragrant while drying. If a moister atmosphere than ours is requisite, it can be found on the shores of Puget Sound, where the climate resembles that of England. Spain, which has in Europe the latitude and climate of California, has never taken a prominent part in the cod-fishery of the Atlantic; but the Californians do not consider themselves limited by the example of the Spaniards.

It is only within a few years that the codfishery has been commenced in the Pacific. In 1864 the first vessel left San Francisco to fish for cod in the Northern seas, and her venture was so profitable that a multitude of others followed her example. Since then the business has been irregular, and is not important just now; but it will soon increase, and take a prominent place among the industries of the North Pacific. Along the shore of Alaska, and the numerous islands belonging to it, the best and largest cod banks are found. The fish are caught in water from fifteen to sixty fathoms deep, and heretofore the vessels engaged in the trade have salted the fish down immediately after catching, and have kept them in salt until their arrival here; whereas the fish would have been better, and the process cheaper, if the drying could have been done near the fishing ground.

The principal fishing grounds are off the Fox Islands, the Choumagin Islands, and Kodiak, and a few boats have gone to the Ochotsk. A large part of the ocean near our new possession offers a fine field for fishing, but the depth of water has been examined in comparatively few places. Off the Choumagin Islands there is a bank, and the depth of water at a distance of thirty-five miles is from forty to fifty fathoms. Fifty miles south, 83° west of the southernmost point of the Choumagin, there is a bank forty-five fathoms. Along the southeastern coast of Afognak and Kodiak, there is a bank of forty-five fathoms, but east of St. Paul's there is a "pocket" with ninety fathoms. South by east, fourteen miles from the eastern end of the easternmost of the Trinity Islands, there is a bank with fifty fathoms. Half-way between Trinity Island and Oukanok, soundings give fifty-five fathoms. East of the south end of Niuniak Island, distant twenty-eight miles, the water is fifty fathoms, and ten miles further east forty fathoms deep. Nine miles southeast from the Sannach Reef, in latitude 54° 20′, longitude 162° 30′, bottom is found at thirty-five fathoms. In latitude 53° 35′ and longitude 164° 10′, soundings are obtained in fifty fathoms. In the eastern part of Behring's Sea there is a cod bank with an area of 18,000 square miles and a depth of less than fifty fathoms.

Our Coast Survey could scarcely render better service to the country than by detailing several vessels to make a reconnoissance of all the waters about Alaska, so as to ascertain precisely where the best fishing grounds are. That is work that must be done, and the sooner the better. Professor Davidson says:

"Next to the fur trade in its legitimate pursuit, the fisheries of the coast of the new territory will prove the most valuable and certain; in fact, I consider them the most important acquisition to our Pacific Coast. As the banks of Newfoundland are to the trade of the Atlantic, so will the greater banks of Alaska be to the Pacific—inexhaustible in supply of fish that are equal, if not superior, in size and quality, to those of the Atlantic, and the pursuit thereof developing a race of seamen yearly decreasing as our steam marine, commercial and naval, is increasing."

§ 140. *Salmon Fishery.*—The rivers of California and the waters of the ocean near its coast, abound with fish. Trout are caught in the little streams, salmon in the Sacramento and San Joaquin, and the rivers emptying into the ocean north of San Francisco Bay; and a great variety of fish are caught in the ocean.

Our fisheries are as yet so limited in extent that few fish are salted, nearly all going while fresh to supply the market of the towns on the coast. Salmon is the only fish salted for export. The species of salmon caught in our waters is called the Quinnat. They are hatched in the rivers, go out to sea when three or four months old, stay there, probably not less than fifteen months, and then return to the river in which they were born, there to spawn. The Quinnat salmon, as found in our waters, averages ten pounds in weight, and sometimes grows to sixty pounds. It enters our rivers in November and remains about four months. Before our rivers were kept in a continual state of muddiness by the gold miners, the salmon ascended every brook in the Sierra Nevada large enough for a fish to swim in; but now they do not leave the large rivers nor ascend them far. The salmon in clear water offer fine sport to the fisherman with the fly, but in California they are caught only as a matter of business, and always in the gill-net, which has meshes just large enough to let the fish get his head in, and then the twine catches him behind the gills and holds him. The net is not dragged, but is stretched across or partly across the river, and is allowed to drift with the current down stream, a distance of some hundreds of yards, perhaps a quarter or even half a mile, the fisherman accompanying it in a boat. The net has lead sinkers at the bottom and cork floats at the top, so as to keep it upright, and it is not so deep as to catch on the bottom. The fish are swimming up the river, so they of course run into the net. A large number of salmon are taken in Eel River, Humboldt County, and great quantities might be caught in the Klamath and other streams along the northern coast. A few young salmon, varying from three to six inches in length, are caught while on their way out to sea, with fine nets, in the shallow waters of San Francisco Bay. The Quinnat salmon is fat when it enters the fresh waters from the ocean, but gradually grows lean, and the color, which is light yellowish red, changes to a deeper shade as it ascends the rivers. The meat becomes leaner, poorer in flavor, and redder in color, in proportion to the length of time that it remains in fresh water; but the little ones which have never seen the salt water, have a more delicate meat than the larger ones fresh from the ocean. No attempt has yet been made to breed fish for our rivers, though it might evidently be done to a profit in many of the streams; but whether in the Sierra Nevada, where the mud abounds, is doubtful. Yet the probabilities of success are sufficient to justify the trial. Fifteen years ago the salmon regularly ascended all, or nearly all, the mountain streams, to points above any of the present mining camps, where the waters are as clear now as they were in 1847. The rule is known to be general, and supposed to be universal, that the salmon leave the ocean in the stream from which they entered it; and it is supposed, further, that they go to the very branch or brook in which they were born. It is well known that there is a salmon in the Klamath River never seen in Humboldt Bay, and various species in the Columbia never found in the waters of California, and salmon in the Quiniault River, Washington Territory, not found yet in any other stream; and the Indians of Oregon say that certain tributaries of the Columbia have species never caught in any other place. If, then, a million of eggs were hatched at the head waters of the Sacramento River, there would be reason to hope that they would return to spawn there.

§ 141. *Various Sea-fish.*—The halibut are not sufficiently abundant on the coast to make the fishery for them a distinct branch of business. They are caught with a hook at sea, in water varying from thirty to fifty fathoms deep, on rocky bottoms. The line called a "trawl-line" is about six hundred yards long, with numerous short lines and hooks, and is left six or eight hours in a place, and when drawn up has halibut, flounders, rock-fish, turbot, cod, and nearly all the large biting fish that come to the market. The bait used is chiefly sardines and herrings.

The mackerel, (*Scomber diego*) a good fish, but smaller than the Atlantic mackerel, is caught with a hook off the coast south of Point Conception. It is a surface fish, and bites greedily at a bit of white rag or shining fish-skin jerked through the water. It does not frequent bays, but is caught in the harbors of Catalina Island.

The little brown rock-fish (*Sebastes auriculatus*) is caught in San Francisco Bay about the wharves; but the other species are only found out in the open sea. They stay where the bottom is rocky, eat crabs and shell-fish, and bite freely at hooks. Most of them are caught near Punta Reyes and the Farallone Islands. The rock-fish are in the market, and of equally good quality throughout the year.

The turbot is caught with the trawl-line throughout the year. Soles are caught with small mesh-nets in the shallow waters of the Bay of San Francisco, at all seasons of the year. There is no separate fishery for them: they are caught with numerous other species of small fishes, among which the smelts have an important place. The smelts are much more abundant than on the Atlantic coast, go in large shoals, and are caught at all seasons. A large business might be done in salting them, but they are caught only for the fresh market. The anchovies are very numerous in San Francisco Bay, where they try to keep in shoals by themselves, but do not succeed, and are caught with other small fishes in nets. They are fully equal to the European anchovy, and may become an important article of commerce. At present, most of those taken are eaten fresh, and only a few are potted. They are caught at all seasons of the year. Sardines are also abundant, and of a flavor equal to those on the coast of France, but larger. They are found in all the bays along the coast from May to October. An attempt was made several years ago to pickle sardines for the market, but it failed. The herring is not abundant on the coast of California, or at least is not found here in such dense shoals as in the Atlantic, and our species is smaller. It is caught with a net in the shallow waters of the bays. Shrimps are caught in the shallow waters of the bay of San Francisco with small mesh-nets, but are becoming very scarce. The sturgeon visits the rivers of the Atlantic States, for only a couple of months in a year, but it is abundant in the Californian rivers at all seasons. It never bites, the mouth being a round hole, always open, surrounded with gristle. In the Eastern States the sturgeon is often harpooned, but here it is caught only with nets. The meat is coarse, and is sold at one-fourth or one-sixth the price demanded for the meat of other fishes. The sturgeon might be salted, but nothing has been done in that business yet. An attempt was made several years ago in San Francisco to establish the business of preparing caviare from the roe of the sturgeon, but it did not prove profitable, and it was abandoned. Sea-bass, a fish of fine, delicate flavor, and highly prized by epicures, is caught with hand-lines outside the heads of San Francisco Bay, and in the bay near Saucelito, with nets during the spring and summer. It is not abundant. The sheepshead, an excellent fish, is caught off Santa Barbara with hand-lines during the summer. It should be brought to the market alive in smacks, for it loses its delicacy of flavor soon after death. The jewfish is abundant south of Point Conception, and may easily be taken with a hook or harpoon. It spends most of its time at the bottom, in both deep and shoal water, but frequently comes to the surface, and according to report, sleeps there. It also goes into lagoons, and likes to be near the kelp. They grow very large, sometimes to weigh five hundred pounds; and as their flesh is very good, a profitable business might be made of fishing for them.

Sharks are taken by Chinamen for food, and by Americans for their oil. The common sharks caught by the Chinamen, perhaps more properly called "dog-fish," (*Acanthea suckleyi*, and *Triakis fasciatus*) are taken in nets during the summer months, and are dried in the sun. They are from three to five feet long, and contain a large amount of meat, which is never eaten by white men, but seems to have favor among the Mongolians. The fish is cut open by a dexterous and quick stroke of a large knife along the back-bone, and is then dried without the use of salt. The fins are considered a delicacy. In Humboldt Bay the true shark, (*Notorhynchus maculatus*) from five to twelve feet in length, is taken with spears. Three men have a flat-bottomed boat, twenty feet long and four feet wide, with which they go into the shallow waters of the bay, whither the sharks resort in pursuit of the sardines. The liver is taken from the shark, and the remainder thrown away. Each liver yields from one to eight pounds of oil. The spears have a handle eight feet long, which is loose, and comes out of the spear-head after the shark is struck. If the handle were fastened in the spear-head, it would be broken by the struggles of the fish. A rope attached to the spear-head suffices to hold him, and by its means he is drawn up to the side of the boat, where he is struck by an axe on the head, and thus dispatched. The shark season lasts only about two months, during July and August. The oil is used for lubricating the machinery of the saw-mills about the bay, and sells for one dollar per gallon; and so long as the season lasts, the fishermen make from five to ten dollars per day.

Monterey Bay is destined to be the seat of a large fishing interest. The bay, being twenty miles wide at the mouth, and ten miles deep inland, serves as a sort of bag to catch the fish, which come running down the coast near shore; and as the depth of water is not great, fishermen have an excellent chance at them. Many kinds of fish, which seldom venture in at the narrow Golden Gate against a strong tide and fresh water, abound at Monterey. There is no better place on the coast for catching sardines and herrings than at Monterey, which town would also be an excellent rendezvous for smacks engaged in catching the larger varieties of fish that are found in the Santa Barbara Channel. So many whales enter Monterey Bay, that there are several whale-boats constantly engaged in hunting them, and about forty are killed annually. The Monterey whale fishers are mostly Portuguese; the Chinese devote themselves to fishing for small fry, of which they catch and dry about three hundred tons in a year. Besides the fish, the Celestials take great numbers of abelones, the mollusks that make the large, bright, univalve, pearl-like shells of our Coast.

§ 142. *Hunting.*—The principal game quadrupeds and birds of California are grizzly bear, elk, deer, antelope, hare, rabbit; the gray Canada brant, the white goose; the canvas-back, mallard, sprig-tail, spoonbill, and summer ducks, the widgeon, the teal, the English black-breasted, sand, and dowiches snipe; the curlew, the mountain partridge, the valley quail, and various kinds of grouse. Nobody makes a business of hunting the grizzly: to attack him is so dangerous, and to kill him so difficult, that many hunters will not shoot at him even when he comes in their way. A large number of them, however, are killed every year, and their carcasses are seen in the meat markets of San Francisco at all seasons of the year. The meat resembles pork in its greasiness, but it is coarser in texture, and rank in flavor. It nauseates some delicate stomachs.

The Spanish-Californians sometimes lasso the bear. When four or five of them, well mounted, and provided with good saddles and reatas, surprise a bear in an open plain, they all beset him at once, and while one throws the lasso over his head, another catches him by a hind-leg, and a third by a fore-leg; and then two horses in front, but a little distance from each other, drag him along, and the third and perhaps a fourth horse follows him, each one keeping his lasso stretched, so that even if the bear should succeed in breaking one riata or slipping it off, he will still be held fast by several others. He is thus dragged to a pen, where he is kept for a bull-fight or some other amusement.

It is only a few years since the elk were abundant on the Sacramento and San Joaquin, but they have now disappeared in those places, and are found in small numbers along the northern coast, where they will soon be exterminated. The meat resembles that of the deer, but is a little coarser in grain. The elk are shy animals, have a very quick ear, and are more difficult to approach than any other game animal in the State, unless the mountain sheep be excepted. They ordinarily lie hidden in thickets during the middle of the day, and feed about sunrise and sunset, at which times the hunters seek them.

The black-tailed deer are good game for the hunter. They may be approached with more ease than the Virginia deer, run with a steady gait, and when disturbed do not run so far. The deer east of the Mississippi go with a run and a jump; the Pacific deer move with a steady run. Their meat is not so sweet as that of their Eastern congeners. The deer live near the timber, and are found along the coast and in the Sierra Nevada. They were at one time very abundant, but are now rapidly decreasing. The best place for hunting them is in Mendocino County. There is no deer-hunting on horseback, nor by large parties. The hunters go out alone or in small parties. Occasionally a deer is caught with the lasso, but this requires an excellent horse, a first-rate vaquero, and a surprise, or when a man riding through the woods will occasionally come within a few yards of the deer before being seen.

The antelope lives in the open plain and in the desert. The valley of San Joaquin was once full of great herds of them, but they, like other large game, have become rare now. They are shy, but inquisitive also, and are easily enticed to approach the hunter, who hides himself behind a rock, and fastening a white handkerchief to his ramrod, waves it back and forth. The antelope, like the deer, is occasionally caught with the reata, but these occasions do not occur once in the year, and when they do occur, they establish the fame of the horse and rider engaged in the exploit.

There is one pack of hounds in the State, and they are sometimes, but rarely, used for hunting coyotes and foxes, as well as deer.

The wild geese and ducks are very abundant in California, from September to March. They spend the winter in the tules of San Francisco Bay and tributary waters, and in the spring they migrate to the north. While here, they afford profitable employment to a number of hunters, who are of two classes—the " boat-shooters " and the " ox-shooters. " The boat-shooters go in parties of two or three, each party having a sloop of its own. The sloop goes to the slough where the game abounds, and there every man starts in his skiff, with three double-barrelled shot-guns. He usually shoots first at the ducks or geese while they are in the water, and afterward again and again as they rise and fly. Sometimes he goes ashore, to shoot them while feeding. The geese spend the night in the water—generally in a slough or pond—and rise about daybreak, to feed in the fields of grain, grass, or wild oats. They remain there during a considerable part of the morning, return to spend the middle of the day in the water, go back to the fields in the afternoon, and at sunset take to the water again for the night. The ducks get most of their food in the tules, and are not often shot on the land.

The ox-shooter stalks his game. He has a trained ox, which walks before him and hides him from the geese or ducks until within good shooting-distance. The boat-shooters average thirty ducks a day during the season; and a good ox-shooter will sometimes kill one hundred and fifty geese in a day.

Snipe, curlew, and quail, are the game for sportsmen who hunt for their amusement, and the modes of hunting them are the same as those in the Eastern States.

The diver or devil's diver frequents the bays of California, and is killed for its pelt, which is used for collars, capes, and muffs, the feathers being fine in texture, making a thick mat, and wearing a smooth surface with lustrous white, gray, and dark gray colors. The bird when shot is skinned by cutting down the middle of the back, so as to preserve the beautiful plumage of the breast entire; and a large pelt, nicely stretched and dried, has at times been worth $3 or $4 in the San Francisco market, and in Europe still more. It is said that as many as one hundred have been killed by one hunter in a day, but that was at a time when they were far more abundant than now.

§ 143. *House-building.*—In the building of houses, the Californians, like Americans generally, are expert and quick. It it is not uncommon to see a wooden dwelling-house commenced and finished within a month. Brick houses are built so fast, that the mortar has scarcely time to dry and harden as the walls go up. Most of the houses are of wood, and of the kind called "Balloon" or "Chicago" frames, fastened together with nails, without tenons and mortices, and with no upright posts thicker than two by four inches. This kind of a frame, called "Balloon" from its lightness, and "Chicago" because they first came extensively into use in that place about fifteen years ago, appears very strange to a carpenter familiar only with the old-fashioned frames held together by tenons and mortices; but weak as the balloon-frame appears, it is really the strongest kind of a wooden building; and it is not unfrequently made four or five stories high, whereas the heavier frame very rarely reaches three stories.

In the balloon-frame, the sills, instead of being eight, ten, or twelve inches square, are only two or three inches by six or eight; and they rest on numerous studs, which again rest on the ground. The sills are nailed together at the corners. The studs are not morticed into the sills, but nailed upon them. The lower joists stand upon the sills, and the upper ones rest upon an inch board "let into" the studs to which they are nailed. On the top of the studs is no heavy plate, but only a board. At the corners two studs are put side by side. Each stud is hoisted to its place separately, so there is no "raising." Wooden houses are all covered with shingles. White pine, imported from the Eastern States, is used to a considerable extent for the frames and casings of doors and windows, and for other inside-work; and nearly all the doors and window-sashes are imported ready made.

Nine-tenths of the houses in the State are of wood; the others are of brick and adobes. Stone houses are very rare. Brick buildings are numerous in the business streets of the cities and towns. Every town of note has its fire-proof brick stores, with iron doors and window-shutters, and its roof of brick laid in mortar. The bricks are made in this State, and the lime is burned here. Brick buildings not constructed to be fire-proof, have shingled roofs. There are a few buildings with fronts of granite, which for one house was brought from China, and that for others from the Eastern States.

Stone houses are very rare in California: it would almost be possible to count all of them on the fingers. Nearly all the dwellings in the counties bordering on the coast, from Monterey southward, are made of adobes, or sun-dried bricks; but most of the houses built of late, and all the elegant structures, are of wood or brick.

§ 144. *Turpentine, etc.*—When the exportation of rosin and turpentine from North Carolina was arrested by the civil war, Butte County went into the production of those things from the pitch of the Western Yellow Pine, (*Pinus ponderosa*) which grows about Forbestown and Magalia, and in other parts of the country, to large size and in great abundance. A hole was cut in the side of the tree in the spring, and the semi-fluid pitch which collected there was put into a retort and distilled, the volatile portion passing off in vapor, and afterwards condensing into turpentine, while the solid matter remained in the form of rosin. This industry was very active for four or five years, but at last has ceased, as North Carolina has again resumed her old industry, and can make rosin and turpentine cheaper than we can.

Some turpentine makers in Butte County tried to distill the pitch of the nut pine, (*Pinus sabiniana*) and after some difficulty succeeded, but found that the liquid produced was different from turpentine, being much lighter and possessing a pleasant odor. An examination of it made by W. T. Wenzel, chemist, showed that its specific gravity is only 0.694, while that of turpentine is 0.840, and its boiling point differs much from that of turpentine. It was first named erasine, but druggists who have sought to convey the idea that they had exclusive possession of it, have called it aurantine, theoline, abietine, and various other names. It is excellent for dissolving grease, and its vapors are fatal to moths.

The manufacturers of erasine buy their pitch delivered at $3.50 per 100 pounds—the price being about twice as high as that of the pitch from the common yellow pine trees. The latter are larger and grow in denser forests, so that one man can collect more in a day. The pitch-gatherer cuts a notch eight or ten inches wide across the tree, and three or four inches deep, with a depression that will hold the sap, which is transferred once a month to a tin can. A tree two feet in diameter will yield from three to four gallons the first year, and more the second and third; and forty gallons of the crude pitch will, when distilled, give five gallons of erasine and twenty-five or thirty of fine rosin. The distillation is more difficult and also more dangerous than that of common turpentine.

§ 145. *Silk.*—San Francisco has now a silk factory engaged in the manufacture of sewing silk. The silk manufacurers are sanguine in regard to the profits of the business in this State. They claim that the expense of living is less here than in Paterson or Lyons; that the warmth of the winters will save the expense of heating the mills, (the threads snap in cold weather, especially when the machinery is first started in the morning) and labor is cheaper.

§ 146. *Sulphur and Salt.*—The production of sulphur and manufacture of its compounds in California, is rising in importance. The chief supply of the world is obtained from the sides of Mount Ætna, in Sicily, and this State used the Sicilian brimstone until lately. The sulphur works on the shore of Clear Lake have at times produced four tons a day—as much as the Coast could consume. The freight from the Mediterranean, the increased charge on account of the combustible nature of the material, and the necessity for keeping large stocks on hand, so as to prevent any disturbance of trade in case a cargo should be delayed or lost, give decided advantages to the home manufacture. The Sicilian brimstone cannot be laid down here for less than four cents per pound, and the domestic article is sold for three and a half cents.

The sulphur bed of Clear Lake is about eight miles from the southern end, on the eastern shore, only a few hundred yards from the water. There is a bank resembling ashes, in which there are numerous alkaline and sulphur springs, and also vent-holes, from which sulphurous fumes escape. These holes are surrounded by beautiful crystals of pure sulphur deposited by the fumes rising from below. The earth, containing about fifty per cent. of sulphur, is placed in an iron retort, which is heated to a high temperature, so that the sulphur is driven off in fumes into a receiver, where it settles in a liquid form, and runs out into pine boxes, two feet long, and a foot square. It is as pure as the Sicilian brimstone, but the latter comes in sticks, which are more convenient for handling, when small pieces are wanted.

The lump sulphur is used chiefly for making powder, and sulphuric acid, which last is employed in making blue-stone, giant powder, nitric acid, and muriatic acid, and in refining gold and silver. The consumption of sulphuric, nitric, and muriatic acid on the Coast, amounts to 2,000,000 lbs, and the entire demand is supplied by home manufacture. The production of flowers of sulphur has been commenced at Clear Lake. The fumes passing off from the retort, instead of being carried into a small hot receiver as for brimstone, are led into a large, cool chamber, in which they condense into a flaky, snowlike form. A large supply of the flowers of sulphur has been required in this State by the vineyardists, who use them to prevent or cure the oïdium, or vine mildew.

East of Kern Lake there is a flat, with an area of twelve square miles, where brine stronger than that of most saline springs can be obtained at a depth of ten feet, and it yields a salt of excellent quality for table purposes. This brine rises to the surface in various places, and in dry weather dries and crystallizes, so that considerable quantities can be shoveled up in an impure condition. Persons at various times have pumped up the water and boiled it down, but nothing is being done now in that way. The natural brine is strong enough without concentration to pickle meat.

Along the coast, salt is made from the ocean at various points where the water can be admitted at pleasure, or is blown by storms into shallow ponds. The most extensive salt ponds of the State are in Alameda County, where several thousand acres in a district extending from near San Leandro to the Mission of San José, are used in summer for the purposes of evaporation; and hundreds of tons of salt are produced there annually, most of it of a very low grade. At the Goleta Ranch, in Santa Barbara County, a flat fills with water during storms and dries up in clear weather, leaving a bed of salt that has supplied a large area of country for many years.

In some of the salt flats along the eastern base of the Sierra Nevada, salt has been obtained for years by evaporating water drawn from pits or wells only two or three feet deep.

The salt-makers, while digging their pits, found large crystals, which they tasted and threw away because they were not good salt. Assays prove that they are borax, and many of these flats, which were not worth $1.25 per acre for the brine, have now been bought up. It is singular that the brine in these flats should be nearly free from borax, and that the crystals in the stratum in which the brine is found are nearly free from salt. The surface of the salt and borax flats is usually covered with slum or dry mud, about a foot thick; and beneath that is a layer of earth and sand, mixed with the borax crystals, from an inch to two feet thick. So far, only one stratum of borax has been found, but others could perhaps be discovered by deep digging. The borax is worth twenty times as much per ton as ordinary salt.

In Southern California, near the line of Nevada, there is a deposit of rock salt in large rectangular and transparent crystals, and it is supposed that by careful search other similar deposits might be found. Some of this salt is quarried now, and hauled away by people in the vicinity.

§ 147. *Beet Sugar.*—The manufacture of beet sugar was commenced in 1870, when 500,000 pounds were manufactured from that year's crop; the beets of 1871 supplied 850,000 pounds; those of 1872, 1,300,000 pounds, and those of 1873, 1,500,000 pounds. There are two factories, one at Santa Cruz, the other at Sacramento. The average yield of beets is fifteen tons to the acre; the average yield of sugar, eight per cent., or 2,400 pounds of sugar to the acre. It has been found that in our climate the beet can be kept with much less expense than in those places where the thermometer frequently goes down to zero. Protection against frost is expensive in Germany, and here it costs nothing. The Californian beet sugar mills are the only successful establishments of the kind in United States, but they are not very profitable, or they would have been enlarged beyond their present capacities. Each is prepared now to work up sixty tons of beets in a day.

CHAPTER VIII.

AGRICULTURE.

§ 148. *Statistics.*—According to the Federal census report, California had, in 1870, 23,734 farms, averaging 482 acres in size. Of those which had 500 acres or more, there were 1,915; 12,248 had between 100 and 499 acres; 3,224 between 50 and 99 acres; and 6,339 between 3 and 49 acres. Tracts of less than three acres were not counted. The round cash value of the farms was $141,000,000; of our live stock, $37,000,000; and of our annual farm products, $50,000,000. The total number of acres in farms was 11,400,000, and the number improved, 6,200,000. According to the latest State statistics, 5,261,000 acres were enclosed in 1871, and 3,653,000 were cultivated, and 20,074,000 were assessed in 1872. The State Report says that the total production of cereals amounted in 1870—we have returns for 1871, but the crop was less then on account of drought—to 30,000,000 bushels, including 17,300,000 of wheat, 9,500,000 of barley, 3,700,000 of oats, and 1,400,000 of maize. In other words, we grew nearly twice as much wheat as barley; nearly three times as much barley as oats; and twice as much oats as maize. In Ohio, on the other hand, they grow about twenty times as much wheat as barley; as much oats as wheat; and fifty per cent. more maize than of the three others combined.

In April, 1874, 4,500,000 acres of land were under cultivation, the increase having been rapid of late years. In 1860, the area was 937,000 acres; in 1866, 1,774,000, and in 1870, 2,992,000, the gain being more than ten per cent. annually compounding. Of the total in the spring of 1874, about 1,500,000 acres were to be credited to the low land of the San Joaquin Valley, 875,000 to the Northern Coast, 1,350,000 to the Southern Coast, 730,000 to the low land of the Sacramento Valley, and 200,000 to the Sierra Nevada, with the addition of Siskiyou and Shasta Counties.

It is estimated that 40,000,000 acres in the State deserve to be considered tillable. The area of the land surveyed is 33,000,000 acres; and the amount disposed of, 22,000,000 acres. The last figure includes 8,000,000 acres of Mexican grants, 7,500,000 acres given for educational purposes, 4,000,000 acres sold, 600,000 given as homestead claims, and 800,000 granted to the State as swamp land. The railroad grants cover 30,000,000 acres in the State, but the patents have been issued for only a small portion of this amount.

§ 149. *Colorado Desert Valleys.*—In considering the districts valuable for agriculture, let us first turn our attention to the valleys east of the Coast and Sierra divides.

The Carriso Valley, opening into the Colorado Desert, near the line of Lower California, has no town, a very dry climate, and a fierce summer temperature. The same remarks apply to San Felipe and Cahuilla Valleys further north, the last being the largest and best of the three, with some excellent soil. A district ten miles wide and forty long, thirty miles east of the summit of the Coast mountains below the level of the sea, could be irrigated from the Colorado, and might, no doubt, be made valuable. The soil, though not very rich, would no doubt be productive when supplied with abundant moisture. Wherever there is any cultivation in the low lands of the Colorado Desert, vegetation reaches maturity six weeks earlier than on the western side of the Coast Mountains.

§ 150. *Valleys of the Enclosed Basin.*—Crossing from the Colorado Desert into the enclosed basin, we come to the Mojave, which rises on the northern slopes of Mount San Bernardino. It is a very irregular stream, sometimes being nearly dry, and there are few settlers in its valley; which may be tillable for a width of two and a length of twenty miles. Tehachepe Valley, drained by White Rock Creek, is ten miles long and two wide. Amargosa River, terminating in Death Valley, has a considerable basin, but no desirable land. Owen Valley, eighty miles long, three miles wide, and 4,500 feet above the sea, is fertile, and is supplied with water for irrigation by numerous creeks that come down from the mountains. Mono Valley, twenty miles long and three wide, is similar to Owen Valley. The East Walker and West Walker Rivers, tributaries to Walker River in Nevada, run through deep cañons in California, with very little tillable land. Antelope Creek, emptying into Honey Lake, has a valley twenty miles long and one wide. It is about 4,000 feet above the sea. Susan River, emptying into the same lake, has a valley twice as large. Some of the land is alkaline and unfit for cultivation. Pine Creek, a tributary of Eagle Lake, has a valley ten miles long and half a mile wide. Surprise Valley, in the northeastern corner of the State, is forty miles long and five wide, and has a rich soil covered in places by a dense growth of wild clover.

§ 151. *Coast Valleys.*—In San Diego County, we find the Tia Juana, (part of it belongs to Lower California) Sweetwater, and Santa Margarita Creeks, and San Diego, San Bernardo, and San Luis Rey Rivers. The last is the most important, but they are all small streams with little level land. Not ten square miles out of fifteen thousand in this county, including three thousand west of the main divide of the Coast Range, are under cultivation.

In Los Angeles County, as we move northward from the San Diego line, we pass successively the San Juan and Alisos Creeks, and the Santa Ana, Coyote, and San Gabriel Rivers. The Santa Ana is the largest stream, emptying into the ocean between Cape San Lucas and Monterey, a distance of a thousand miles; and yet its bed for ten miles nearest the sea is dry for six months of the year in ordinary seasons. Its waters are used for irrigating San Bernardino, Riverside, Anaheim, Santa Ana, Cocamongo, Jurupa, and Chino.

San Bernardino has the best wheat land in the State south of 35°, and a considerable part of it is table land, a thousand feet above the sea. Both the upper and lower plains are well adapted to the cultivation of the vine and sub-tropical fruits.

The San Gabriel River ranks next to the Santa Ana in size on the western slope of the Coast mountains, south of Monterey. Near the main stream are San Gabriel, Monte, Nietos, San Pascual, Santa Anita, and Wilmington; on its branch, the Los Angeles River, is the town of Los Angeles. About fifteen miles from the ocean the San Gabriel breaks through a ridge of hills, above which, for a distance of two miles, the river disappears in the summer and fall, making its way underground through a sandy plain, and then reappearing below at the cañon in the hills. This plain is covered with willows, and is called the "Monte," which in Spanish means either a mount or a forest. The earth here is moist, and is the best for maize in the State. The soil in all the Coast valleys south of 35° is sandy, and at Los Angeles and Anaheim much of it is nearly pure sand. After running a stream of water for a few hours through an irrigating ditch, nothing save gray sand is left in sight. On the bottom land below the hills, water stands about ten feet below the surface, and artesian water is obtained about seventy feet deeper. Artesian water has also been found in the San Bernardino plain. The valleys of the Santa Ana and San Gabriel contain many vineyards, and have more large orchards of sub-tropical fruit than any other part of the State.

The Saticoy, or Santa Clara River, has a length of seventy miles, and for forty miles nearest the sea its bed is dry in the fall. The soil of its valley is sandy.

The Buenaventura River has a valley about twenty miles long, with an average width of a quarter of a mile. There are numerous little valleys in Ventura County, all well adapted to the cultivation of sub-tropical fruits. Artesian water is found near the mouth of the Buenaventura River.

The Santa Barbara plain, at the southern base of the Santa Inez mountains, has some of the finest orchards of sub-tropical fruits in the State.

The Santa Inez River has a valley about thirty miles long and two wide, but has no considerable town or extensive cultivation; and the same remarks apply to the Cuyama River, which lies to the north of it. Both of them reach the sea through cañons, the widest parts of their valleys being back ten or fifteen miles from the ocean.

The Salinas valley, the largest of all the coast valleys, is ninety miles long, and from eight to fourteen wide. Three terraces are distinctly traceable on each side of the river. The first and lowest is about four miles wide, with a sort of a rich, sandy loam; the second rises with an abrupt edge, is eleven feet higher, has about two miles of width on each side, and has a coarser, poorer soil; the third terrace is less regular in height and width, and has a coarse, gravelly soil, scarcely fit for cultivation. This terraced formation, with its variations in richness of soil, is a strongly-marked feature of many valleys in the State. The southern or upper part of the valley is very dry, and the cultivation is confined almost entirely to the lower or northern part of it, within convenient reach of steam communication.

The Pájaro valley has two branches, one coming from the southward, the other from the northward, and both rich. In the northern branch, about ten miles south of the town of Gilroy, is a plain of about ten thousand acres of rich swamp that needs draining.

The San Lorenzo, flowing southward into Monterey Bay, is the first stream to which we have come with a considerable body of forest in the low land of its basin. The pasturage is good, but the area of tillable soil is scanty.

Passing by the Golden Gate in our northward course, we find that the next noteworthy stream entering the ocean is Russian River, which has a main valley forty miles long and about three miles wide, much of it very fertile. It has also a number of small tributary valleys, including those of Green, Dry, Santa Rosa, Mark West, Knight's, Spring, Redwood, and Potter Creeks.

Walhalla, Navarro, Eel, and Mad Rivers, are in the redwood region, and those portions of their basins within twenty miles of the ocean are covered with dense forests of the Coast Sequoia, which is almost ineradicable; and tillage is possible, or at least profitable, only in places that happen to be free from those trees.

The Klamath rises in Oregon, and has a considerable part of its basin, including much fertile land, in California. Nearly all of its tillable soil is 2,000 feet or more above the level of the sea, and is exposed to severe winter and frequent frosts in spring and fall.

§ 152. *San Francisco Basin.*—The San Francisco Basin, lying west of the Diablo Divide and finding its outlet to the sea at the Golden Gate, is the richest part of the State. It extends from Calistoga to Gilroy, a distance of 120 miles from north to south, and is about twenty-five miles wide. Going southward from San Francisco, on the eastern side of the Gabilan Ridge, we pass San Andreas, Raymundo, and Redwood Valleys, opening into the San Mateo plain, bounded on the east by San Francisco Bay. These little valleys are well wooded, have good soil, and beautiful scenery; and the country below them is covered with the country residences of the rich men of San Francisco.

Santa Clara Valley, about thirty miles long, and ten miles wide at its mouth, is the richest and largest of the valleys in the San Francisco Basin. Its proximity to the metropolis, its facilities for communication by land and water, and the abundance of its artesian wells, contribute to attract population and stimulate cultivation. Wheat, temperate fruits, and strawberries, are among its chief productions. Much of the valley is covered with scattered oak trees.

The Alameda plain, between the Contra Costa Ridge and San Francisco Bay, has a rich, deep soil, excellent for wheat and barley, and part of it well adapted to the cultivation of kitchen vegetables; and of these the metropolis gets a large portion of its supply here. Orchards of apple, pear, plum, cherry, and peach trees, are numerous.

Between the Contra Costa Ridge and the Diablo Divide lies a valley called Amador, Livermore, San Ramon, Alamo, and Pacheco, in different parts. The first two have their outlet to the southward; the last three send their waters to the Strait of Carquinez, at Martinez. Alameda Creek, which drains Amador and Livermore Valleys, runs through Suñol Dale, which is about three miles in diameter, and is surrounded by steep mountains.

Tasajera and Diablo are small valleys running down from Mt. Diablo.

Crossing the Strait of Carquinez, we come to Napa Valley, which is forty miles long, by two miles of an average width. At the lower end the soil is a deep loam, and very fertile; near the upper end we find much gravel. Wheat is cultivated in the rich soil; vineyards and orchards are more profitable farther north. The possession of a railroad, of numerous places of fashionable resort, of beautiful scenery, and a healthful climate, have contributed to place Napa Valley next to Santa Clara in relative wealth. Conn and Brown Valleys are small tributaries of Napa.

Sonoma Valley is about fifteen miles long and two wide. Most of the soil is thin and not well adapted for grain, but the grape flourishes, and this valley has more vines than any other district of its size in the State.

Petaluma Valley, about twenty miles long and three wide, has a rich moist soil, and a cool climate, and is well adapted to the cultivation of fruit, maize, and wheat.

§ 153. *Sacramento-San Joaquin Valley.*—The Sacramento-San Joaquin Valley is three hundred and fifty miles long from north to south, and forty miles wide, with an area of 14,000 square miles, not more than five hundred feet above the sea level. On the western side there are few streams; on the eastern, many. Near the middle of the valley there is much tule or swamp, and south of Tulare Lake there is some alkaline soil. The entire valley has a warm summer climate, and the greater portion of its surface is bare of trees, and is too dry to produce wheat regularly without irrigation. The supply of water available for irrigation is abundant, and the topography of the country not unfavorable for the construction of canals.

The only minor valleys of note, tributary on the west side to the Sacramento-San Joaquin Valley, are the Suisun, Pleasant, Putah, and Cache Valleys, all of them formed in the coast mountains, not far north from the Strait of Carquinez, and all of them fertile and well adapted to the cultivation of grapes and fruit. Tributary to Putah Valley are Berreyesa, Pope, and Coyote Valleys, and tributary to Cache Creek are the valleys of Clear Lake, (which lies about a thousand feet above the sea) and Long, Bear, and Indian Creeks.

Most of the rivers coming down from the Sierra Nevada have little bottom land until they get down into the main valley. King's, Kaweah, Tule, and Kern Rivers, which reach the middle of the valley south of 36° 30′, all have deltas of rich, moist soil, on which the water may be found at a depth varying from seven to twenty feet. These deltas are admirably adapted to the cultivation of cotton.

§ 154. *Farming Advantages.*—The Californian farmer has a great advantage over those of the northern Atlantic States, in the mildness of the winters. Here we have no snow or ice, and no time is lost because of cold. Neither are our frosts so severe as those east of the Mississippi. The climate in the valleys is so warm, and the sky so clear through the winter, that vegetable life is, in ordinary seasons, almost as active in January as in July; and our trees and shrubs have nearly twice as much time to grow and mature as in the free States of the East, where frost reigns from October to May. It is a well known fact, that California has produced larger specimens of garden vegetables, more thrifty growth and rapid development of fruit trees, and larger crops of small grain to the acre, than any State in the Union, and many persons have supposed our soil to be richer. No comparison of our soils has been made by chemical analysis with those of Illinois, Missouri, Indiana, and Ohio; but the probability is, that the latter are more fertile. The loam is deeper; the vegetation has been greater, and it has enriched the soil by the accumulation of its decomposed remains through thousands of years; whereas in the valleys of California, the vegetation is comparatively scanty, and the air is for much of the year too dry to permit a decomposition of wood or grass to enrich the soil. The bottom lands of the Sacramento and San Joaquin are far inferior in depth, blackness, and fertility of loam, to the valleys of the Miami, Wabash, and Illinois Rivers.

Our domestic animals can live through the winter without shelter and without cultivated food, and thus several items, causing much expenditure in Ohio, are here saved.

The dryness of the summers saves much trouble and expense. Weeds cannot grow here as they do in a moister climate. A late ploughing finishes them for the season.

Barns are not generally used in California. The grain, after cutting, is put into a stack, or thrown into a heap, until a threshing-machine can be obtained, and the grain is then placed in the granary. Between harvest and threshing time there is little danger of rain; and to such slight danger as there is, every farmer exposes himself. Barns in other countries are necessities: here they could not be used if we had them. Not unfrequently the grain, within two weeks after cutting, is stored in a warehouse in San Francisco; often it is left lying in sacks upon the fields until it is sold—a period of months. In August and September, the square piles of white sacks in the stubble-fields are a common and prominent feature of the Californian landscape in the farming districts.

As our valleys are not covered with sod, so the first ploughing is nearly as easy as any of the subsequent ones; and the severe task of breaking prairie, so common in the States of the upper Mississippi Valley, is unknown here.

§ 155. *Disadvantages.*—The most serious disadvantage of California as a farming country is the frequency of droughts. The necessity of irrigation over a large part of the State imposes a heavy burden on the farmer, equal generally to two dollars an acre, annually; and although this expenditure is more than repaid in the increased yield, yet many of the farmers cannot afford to make the advance. Without irrigation, there is no proper rotation of crops, and the soil is exhausted by the cultivation of the same grain for many successive years. Rotation is impossible on the greater part of the land, because its dryness will not permit the growth of roots or common grasses. The soil is too dry for maize, potatoes, turnips, clover, alfalfa or lucerne, and timothy or herd's grass. Peas and beans yield well in only a few localities. In consequence of the dryness of the summers, our farming is confined chiefly to wheat and barley, which are produced in surplus, and are governed in prices by the distant markets to which we must send them at our expense.

Ploughing commences with the first heavy rain, but the farmer may lose much time in waiting for it to come. The heat and drought of summer and autumn bake the ground, and render it too hard for the plough; so the sooner the rains come, after the first of October, the more convenient for him, and the more work he can do. The rain must be sufficient to wet the earth down four or six inches deep; a little shower will not suffice. The soils of loam and clay are so hard, that no ordinary plough is strong enough to break through them; and ploughing would do no good before the rains, because the earth would be in large clods, which would furnish little nutriment to the grain. If, however, the land had been ploughed late in the spring and allowed to lie fallow, it may be in good condition for ploughing in the early fall. Grasshoppers, akin to the "locusts" mentioned in the Bible, have frequently done great damage to the crops, though not in the middle of the larger valleys, where extensive areas have been regularly cultivated.

§ 156. *Droughts.*—It is estimated that twelve inches of water are sufficient to secure a good wheat crop in California—that is, distributed at the time and in the manner best adapted to the growth of the grain. But the rains do not come at such times and in such manners. They pour down in excess in one month, and they fail to appear in the next. They may be abundant—either too early, or too late to do much good; and usually there is a partial failure when the rainfall does not amount to sixteen inches, and when less than fourteen inches, the failure is general. In the last twenty years there have been seven of general failure in the Sacramento Valley, and the proportion is still larger in the San Joaquin Valley, where the rainfall is considerably less.

The most disastrous drought in the history of the State was that of the summer of 1863 and 1864, the two winters preceding them having brought, together, only as much rain as should have been brought by one winter. The result was a complete failure of grain and grass everywhere, save on the northern coast, and a great mortality among farm animals. Out of 3,000,000 horses, neat cattle, and sheep, in the State, more than 800,000 died by starvation. The southern coast suffered most severely, and in some counties two-thirds of all their neat cattle died.

§ 157. *Fences.*—In the matter of fences, the Californian farmer is at a disadvantage, as compared with his Eastern brethren, who usually have timber enough on or near their land to fence it; but here, in the agricultural districts generally, trees fit for making rails or boards are lacking. Throughout the United States, the system has prevailed of permitting horses, cattle, sheep, and hogs, to run at large, with no right of indemnity for any damage which they might do in cultivated fields, unless surrounded by a "lawful fence." This may be a good system for the pioneer, who tills little land, and wishes his horses and cattle to have a wide range; and it was well suited to the pastoral life of the Spanish Californians previous to the American conquest: but it is of doubtful policy as applied to the present condition of affairs, at least in the principal agricultural valleys, where all the land is under plough.

According to the Federal Agricultural Report of 1871, California had, in 1870, 4,971,504 acres under fence, used 66,000 miles of fencing; the cost of the present fencing is $29,600,000; the annual cost of repairs is $1,800,000; the annual interest on the cost is $1,770,000; the annual interest and repairs together amount to $3,575,000, and the average cost of new fencing is about $450 per mile. The estimate of $1,770,000 for the interest on the cost of the fencing is too low, and is based on an allowance of only six per cent. annually; whereas twelve per cent. is nearer the true figure, making the yearly interest about $3,500,000: and adding that sum to the repairs we have $5,300,000 as the total annual cost of the fences as they were in 1870. From the agricultural statistics of the Federal census, we find that the gross value of all the farm animals in the State in 1870 was $38,000,000, and if we deduct $8,000,000 for the sheep which are herded, and $10,000,000 for horses and cows which are never allowed to run about, we have $20,000,000 as the value of the live stock against which fences are necessary. The annual profit on these may be fifteen per cent., and the inference is clear that one set of land-owners must pay about $4,000,000 to let another set make $3,000,000.

Board-fences are the best. They are usually made five feet high, with redwood posts set eight feet apart, and five spruce boards six inches wide and an inch thick in each panel. Such a fence, well made, costs five hundred dollars a mile. Worm and post-and-rail fences are common near the redwood districts —for instance, in Sonoma, Mendocino, Humboldt, Marin, Napa, San Mateo, Santa Clara, and Santa Cruz Counties. The farmers generally make their own fences of these kinds, and the cost is of time, not money. When the work is done by the job, it costs from three to six hundred dollars a mile, according to the distance and position of the timber, and the quality of the wood: the price increasing in proportion as the trees are far off, or situated in deep cañons, and as the wood is tough and cross-grained. Ditches are common in the tule-lands. Hedges are made with willows and cactus in Los Angeles, San Bernardino, and San Diego Counties. There are a few hedges of osage-orange and gorse, for ornament, in the counties about San Francisco Bay, but none for use. The osage-orange grows thriftily about San José, where it can be irrigated, but hedges are liable to much damage from gophers, which are fond of the roots; and if a hole is made, it is difficult to get young plants to grow, the older ones choking them down. After the third year, irrigation is not necessary. In dry land, where water is not abundant for irrigation, the hedges do not grow up regularly. In the general opinion of farmers, osage-orange hedges will not pay, even in the land best suited for them: the labor of planting the seed, transplanting the sprouts, irrigating, replanting, and trimming for three years, costs more than a board-fence, which is useful from the first day, and is in no danger from gophers, whereas the hedge is useless for three years, and is in constant danger.

The willow-hedge is the most common fence in Los Angeles

County, and is a prominent feature of the scenery near the towns. The fence is made with cuttings, the larger the better; the largest are three inches in diameter and eight feet long. These are planted perpendicularly three feet deep and nine inches apart, and then irrigated freely, when nearly all will grow and make a good fence in the second year. If larger cuttings cannot be had, small ones, half an inch thick and two feet long, are taken: only an inch or two is left above ground, and four or five years may be required to make a tight fence. Twigs and poles are woven horizontally through the hedge. In the course of eight or ten years, the willows grow to be trees, with trunks five or six inches in diameter, and with dense tops from fifteen to thirty feet high. They thus not only shut out trespassing animals, but furnish a large amount of firewood—an item of no small importance in the woodless plains of the south—and throw a pleasant shade over the roads which they line. The willow-fence requires frequent irrigation, for its growth will usually depend upon the amount of water supplied to it.

The cactus was used extensively for fences at the old missions, and some fields are still enclosed with it. The plant is merely thrown upon the ground, where it takes root, no matter how dry or barren the soil, and grows up in a dense mass of thick leaves, six feet high and from five to ten feet wide. It is covered with thorns, and is feared by all large animals, but spermophiles and gophers are fond of burrowing under it, for it protects them against their enemies, and its leaves furnish them with food.

Several machines have been made to cut ditches through swamps, and throw the dirt up as an embankment on one side, but none of them have been very successful; and the spade is still considered the best instrument for making fences in the tules.

§ 158. *Varieties of Wheat.*—Many kinds of wheat are cultivated here, of which the main are Club, Chile, Australian, Odessa or Old Californian, Red Mediterranean, Sonora, Oregon White, Bald, and Egyptian. The general division of wheat into "winter" and "spring," common in the wheat-growing districts of the Eastern States, is unknown. All our wheat may be set down as spring wheat. When winter wheat is brought here from abroad, it does not thrive the first year; but in the second year, having been converted into spring wheat and acclimated, it yields well. The Chile gives general satisfaction, and is more cultivated than any of the others. The Australian has a tendency to smut, but this is corrected with blue vitriol. These two form three-fourths of the crop; the other fourth is made up chiefly of Mediterranean and Sonora. The Egyptian yields largely, but has little gluten, and is fit only for coarse bread or maccaroni. All the acclimated wheat of the State is white; though imported red seed shows its color the first year, but in the second year it looses its redness.

§ 159. *Quality.*—The qualities in which the best wheat excels are glutinousness or strength, flintiness or dryness, whiteness of color, thinness of skin, cleanness, plumpness and size of berry, and weight.

The value of wheat depends, to a great extent, upon its strength. In this point lies its chief difference from potatoes, which always do and must occupy an inferior place upon our tables. Much gluten in flour renders the dough tough, makes handsome bread, with the air bubbles in it small and uniform in size, and retains moisture, so that the bread will weigh much in proportion to the flour used; while if the amount of gluten be small, the grain of the bread will be uneven, the dough will give way in places, allowing the formation of large cavities, and less moisture will be retained. The wheat of different countries varies greatly in glutinousness; and California occupies a very high position. Our wheat is far more glutinous than that of any other North American State, or country of middle or northern Europe. The consequence is, that our wheat is now in demand in New York and England, to mix with their weak grain, so that a tolerably strong flour may be made.

But the wheat of California is not all equally glutinous; some of it is much weaker than other. The most glutinous is that grown in Santa Clara Valley; the southeastern part of San Mateo County; the southern part of Alameda County; and Diablo, San Ramon, and Suisun valleys. That of Santa Rosa, Pajaro, Salinas, Petaluma, and Sonoma, is much inferior in glutinousness, but is better than that of the Sacramento, San Joaquin, and Napa Valleys, the vicinity of Half-Moon Bay, and Alameda, opposite the Golden Gate. The strongly glutinous is about one-third of the crop of the State. It is not known why the wheat in one district is more glutinous than in another. None of that grown very near the coast is strongly glutinous, so the moisture seems to be injurious. Napa wheat is inferior in glutinousness to that of Sonoma, though farther from the coast, and more free from ocean-fogs; but the soil of Napa is much more moist.

In Oregon and Washington, where the climate is very moist, the wheat is as weak as at Half-Moon Bay. In the Mississippi Valley, where a great amount of rain falls, the wheat is also weak; and just in the Gallego and Haxall districts, if report be true, the rain-fall is less than in any wheat district east of the Alleghanies. And yet in the Sacramento and San Joaquin valleys, which are among the driest parts of California, the wheat is very weak. This is accounted for—by those adopting the theory that glutinousness depends entirely upon the climate—by saying that those valleys are visited, while the grain is in the milk, by weather so hot that the berries are burned, and are prevented from attaining their perfect development. It would be well if this matter were thoroughly studied, for it is one of much importance to the merchant and ship-owner, as well as to the farmer, the baker, and the consumer.

The wheat grown on the clayey loam about Alviso, is not so glutinous as that produced on the sandy loam about Santa Clara, and the gravelly clay in other parts of the valley. It is worthy of remark, that the soil of the Putah and Cache valleys, tributary to the Sacramento, differs in no noteworthy particular from the soil in Suisun, Diablo, and San Ramon, which latter yield strong, while the former produce weak wheat. It has been observed that during late years, the wheat of a large farm in San Mateo County, one of the best cultivated in the State, has been gradually decreasing in strength. It is not known whether the change is caused by a difference in the seasons, or by a progressive exhaustion of the soil. So far as observations have been made in California, the amount of gluten is not affected by early or late sowing, thorough or careless cultivation, largeness or smallness of the yield, or cleanness of the crop.

In flintiness or dryness, Californian wheat has no superior, and no equal save in the Chilean. It may be stored in bulk, or it may be thrown into the hold of a ship within two weeks after harvest, and then sent twice through the tropics, and there is no danger that it will heat or sweat. The same may be said of its flour. No wheat or flour from the Atlantic States is near it in this respect. In August, 1860, J. B. Frisbie loaded a vessel at Vallejo with wheat taken from the harvest-field—it had never been inside of a house, but had lain upon the ground for several weeks after threshing—and that cargo of wheat, when discharged at Liverpool, was as sweet and clear from mustiness, mould, sprouting, or fermentation, as it was when harvested. The Atlantic flour, when kiln-dried and pressed, does not keep like ours as it comes from the mill, after having gone thither fresh from the threshing-machine and the harvest-field.

The flour made from flinty wheat is peculiarly suited for shipment to tropical countries, where a moister flour soon ferments and sours. These are excellent markets, for they are certain, they pay well, and there is little competition. Most of the flour now exported to the West Indian Islands and the Maylasian Archipelago, is of the Gallego and Haxall brands, which, because of their dryness and strength, are worth from twenty to fifty per cent. more in the market than other flour. California may not be able to supply the West Indian Islands, but she certainly has peculiar advantages for supplying the tropical islands and shores of the Pacific. The flintiness of our wheat is undoubtedly owing to the dryness of the climate, and it is about the same in all the wheat-growing districts of the State. There is no noteworthy difference in this respect between that of the Sacramento Valley and that grown on the immediate coast. It is all so dry as to keep well in any climate. Millers in New York and Liverpool make some objections to our wheat—that it is too hard for their millstones; but this is their misfortune, not our fault. The difficulty is remedied by moistening the wheat before grinding.

Most of the wheat of this State is white, but it is not equal in whiteness to that of the Genesee Valley, Oregon, Washington, and some other districts of the United States; yet is superior to the wheat of England and of most European countries. The fogs give a dark color to the wheat grown at Half-Moon Bay, in the Pájaro and Petaluma Valleys, and on the Santa Rosa plain; but in the other districts a uniform whiteness prevails.

Our wheat generally has a thin skin, and does not make much bran; but in the districts where the skin is darkened by the fogs, there also it is thick.

Most of the Californian wheat is not well cleaned. It is sent to the market containing oats, barley, chess, alfalfa-seed, and dirt; and when shipped to New York must often be cleaned there before it can be ground. Our farmers, however, are gradually becoming more careful in cleaning their wheat.

In the plumpness and size of the berry, our wheat compares well with that of Europe and the Atlantic States, but can perhaps claim no decided superiority. Comparing the different districts of the State with one another on this point, Suscol probably deserves the first place, and Napa the next. In the Sacramento and San Joaquin Valleys, the wheat is often shriveled by hot winds, which blow for three or four successive days while the grain is in the milk, and seem to blast it. Great differences are observed, however, according to the season.

The weight of Californian wheat is usually sixty pounds per bushel, seldom less — frequently sixty-two, and sometimes sixty-five; thus entitling our State to a high position in that respect.

§ 160. *Yield.*—The average yield of Californian wheat-fields is from twenty to twenty-five bushels per acre, which is about thirty-three per cent. more than in the States on the Atlantic slope. An old Spanish book of records, of the Mission of San Diego, states that in 1778 twelve *fanegas* (a fanega is about two bushels) of wheat were sown, and three hundred and fifty fanegas were harvested—an increase of thirty-fold. The next year, sixteen fanegas were sown, and the yield was one hundred and sixty fanegas. In 1780, twenty-four fanegas were sown, and eight hundred harvested—an increase of thirty-three-fold. San Diego is far inferior for wheat-growing to the coast valleys about San Francisco Bay; and previous to the coming of the Americans the ground was not ploughed, but only scratched, and the limb of a tree was used for a harrow.

Colton, in his "Three Years in California," (page 442) states that while the priests still had sole control of the missions and mission-lands previous to 1833, the *mayordomo* or steward of the Mission of San José, harvested 4,300 fanegas of wheat from 40 fanegas of seed; and at the next harvest he had a volunteer crop of 2,600 fanegas on the same land. The first year, according to this report, the increase was 107-fold, and the next year 65-fold. At the Mission of Soledad, according to the same author, (page 445) 1,700 fanegas were harvested from 19 sown—an increase of 89-fold; and in 1827, an increase of 58-fold was obtained at San Luis Obispo by scratching the seed in with a harrow upon land unploughed, and not even touched by the thing called a plough in those days. Not less than half a fanega is sown to the acre; so we may suppose that the figures which indicate the increase of the crop over the seed, also indicate the number of bushels to the acre. Now, a ten-fold increase is considered a fair crop. Crops of 80 bushels to the acre have often been grown in California. Mr. Hill harvested 82½ bushels from an acre in Pájaro Valley in 1853, and obtained 660 bushels from 10 acres. In 1851, Mr. P. M. Scooffy harvested 88 bushels, and Mr. N. Carriger 80 bushels in Sonoma Valley. In 1853, J. M. Horner harvested 1,000 acres of wheat near the Mission of San José, with an average of 40 bushels, some of it producing 60 bushels to the acre. The next year he had 2,000 acres, with an average of 40 bushels. Large fields of wheat in Eel River Valley, according to the report of the assessor of Humboldt County, averaged 73 bushels to the acre in 1857.

In the best wheat districts of the Mississippi Valley, the farmers generally believe, or did believe a few years ago, that not more than 45 bushels of wheat ever had been or ever could be grown upon an acre; and when I spoke to experienced and intelligent men among them of 60 bushels, I was told that not more than 50 bushels could possibly stand upon the ground. It is almost impossible that there should ever be an entire failure of the wheat-crop in California, unless the rain should completely fail. After wet winters, the dry lands and hills will produce the best crops; in seasons of light rainfall, the low, moist lands will take the lead. There are so many soils and so many climates in the State, that some must be favorable. There is no danger that the grain, when nearly ripe, will be beaten down by the hail, as has happened in Europe and the Atlantic States. On only one occasion, within my knowledge or reading, has it happened that the grain has been "lodged" or beaten down by rain, and that was at Suscol and Napa in 1860; and the damage then was slight.

§ 161. *Cost.*—The richest grain land of the State, that in the valleys near San Francisco Bay, has been cropped for many years without rest or rotation, and the large yields have become exceptional; and now thirty bushels to the acre is more of a rarity than forty was fifteen years ago. The average wheat crop of the State was about seventeen bushels per acre in 1867, eighteen in 1868, sixteen in 1869, thirteen in 1870, and nine in 1871. In the counties bordering on San Francisco the yield is considerably larger, but the average for the State is reduced by the results in the San Joaquin Valley, where large areas have been cultivated in a shallow and cheap style, and a dry and not very strong soil. Gang ploughs are used, usually two or five in a gang, sometimes six, eight, or even ten, each cutting a furrow ten or twelve inches wide, and four or six inches deep. A span of horses is required for each plough in the gang, one driver for the entire team. Frequently a machine sower and harrow are attached behind the ploughs, and thus at one movement the land is broken, sown, harrowed, and prepared for its first harvest. The lightness of the soil, the lack of a sod, and absence of stones, bushes, and trees, permits the reduction of the land from its wild state to cultivation at very little expense—that is, after abundant rains have come to soften the earth.

A sulky gang with two ploughs, each cutting twelve inches, drawn by six horses, will dispatch four acres per day; while a five-gang plough, each cutting ten inches, drawn by eight or ten horses, will dispatch eight acres in a day, only one man being required in each case. The cost per acre of ploughing large fields is variously estimated at from forty cents to one dollar per acre to the farmer provided with horses and gang-ploughs. Generally the cost of ploughing in small farms and on the strong soils is estimated at various prices, from two to three dollars per acre.

The following is an estimate of the expenses of a wheat crop in Stanislaus County, per acre: ploughing, $1.25; seed, 50 cents; sowing and harrowing, 75 cents; heading and stacking, $1.25; threshing, $1.25; rent $2; sacks $1.75; hauling, $1; total $9.75. A yield of twenty bushels to the acre, worth $25 in good years, would leave a nice profit. The hauling varies greatly in different places, and the prices and seasons are so irregular that it is unsafe to rely upon them.

It is a custom with some farmers in the San Joaquin Valley to divide their land into three parcels. One is ploughed and sown; another, having lain fallow the previous season, is simply sown and harrowed; and the third is ploughed to lie fallow. Another rotation of a less prudent character is to plough and sow a third; let another third volunteer for grain; and another volunteer a second time for hay.

Wheat is sown from the first of November to the first of April. The most certain crops are those sown early; the largest are those sown late in favorable years. If the amount of rain is small or moderate, the earliest sown fields are the best; but if the spring be wet, the early-sown fields are surpassed by those sown about the first of February. Wheat is usually sown after barley and oats. The best farmers prefer to sow between New Year's Day and the middle of February. Most of the sowing is done broadcast, but drills are used to a considerable extent. One ploughing is, by most farmers, considered sufficient. The harvest comes from the middle of June to the middle of July.

§ 162. *Barley.*—The soil and climate of California appear to be particularly favorable to the growth of barley, which formed, previous to 1860, a larger proportion of agricultural produce here than in any other part of the world. It is a hardy grain, preferring a sandy or gravelly soil, and dry climate. Three kinds are grown in California—the common, the Nepaul, and the chevalier. The Nepaul and chevalier are cultivated to a small extent, the latter chiefly for pearl barley, of which a little is made in the country. The yield of the chevalier is from ten to twenty per cent. less than that of the common barley.

The sowing commences with the first heavy rain, which comes in some years as early as the first of November, and continues to the first of April. The ground used for small grain bakes hard during the heat and drought of summer and autumn; and ploughing is not possible until the rain comes, and rain enough to wet the earth thoroughly, at least six inches deep. The ploughs are then set to work immediately, running from four to eight inches deep. One ploughing is usually considered sufficient. The grain is sown according to convenience, soon after the ploughing, or after the lapse of weeks, and is immediately harrowed in. The amount of seed sown to the acre varies from a bushel and a half to two bushels. The sowing is usually done broadcast, but some farmers prefer the drill. Early sowing gives the best yield, if the winter rains be light; but when the rains are abundant, the late sown fields are the best. There is always danger that small grain in California, if sown early, will get more rain than it wants. The same barley is sown early and late; our farmers do not know any thing of "winter barley" as distinct from "spring barley"—a division familiar in the Atlantic States.

The harvest precedes that of wheat: commencing in the Sacramento basin early in June, and in the Coast valleys late in the same month. The grain is all cut with reaping machines, and is never housed, but is threshed on the field, with or without stacking. Sometimes it is bound; frequently it is gathered in a tight wagon-bed, and hauled into a pile in the center of the field, where it remains until the threshing machine can come. The rarity of rain from June to October renders this course pretty safe; though it has happened, on one or two occasions during the last ten years, that grain in the field has been injured by September rains. The same land is cultivated year after year in barley, without apparently exhausting the land so much as wheat does. A field near Gilroy has produced a large crop of barley every year since 1853, with sowings only every other year, and without irrigation; but when the grain was ripe, hogs were turned in to harvest it, and they enriched the soil while they fattened themselves.

Barley crops of sixty bushels to the acre are not rare. In 1853, a field of one hundred acres, in the valley of the Pájaro, produced ninety thousand bushels, and one acre of it yielded one hundred and forty-nine bushels! It was grown by J. B. Hill; was mentioned as undoubtedly true by the assessor of Monterey County in his official report; and a prize was granted by an agricultural society for the crop. The field which took the prize of the State Agricultural Society in 1859, yielded sixty-seven bushels to the acre. The field was a large one, and ten acres, (a fair sample of the whole) were measured. The crop which takes that prize is not necessarily the largest crop in the State, but only the largest among those offered for competition. No doubt, many larger crops were harvested in 1857. In 1859, ninety bushels of Nepaul barley were grown to the acre by Mr. Burrell, in Santa Cruz County, but in a small field. Large amounts of volunteer barley are grown every year, and the yield is often excellent. One case is reported of a field in Yolo County, which produced five successive volunteer crops of barley, the last and least crop amounting to thirty bushels per acre!

§ 163. *Oats.*—The principal varieties of oats cultivated in California are the Australian, English, Bare, Feather, Norway, and Tucker. The Bare and Tucker oats thrive best on a heavy soil; the Feather oat prefers a sandy loam. The indigenous wild oat of California is never cultivated; for although it produces large and tall stalks, they do not contain so much weight, or bear so much grain, as the domesticated oat. The average crop is from 30 to 40 bushels [illegible] 30 per cent. greater than in the Atlantic States. The Crescent City *Herald* reported in October, 1857, that Rigg and Reid, in Del Norte County, had grown 125 bushels of oats to the acre; and that John A. Brown, of Crescent City, had a crop of 157½ bushels to the acre.

§ 164. *Maize.*—Maize can be grown to advantage in only a few places in California. Most of the land is too dry, and the summer nights too cool for it. The principal maize districts are in the valleys of the upper coast, from Russian River to Humboldt Bay; in Yuba County, upon the moist bottom-lands of the Sacramento River; and at the Monte, in Los Angeles County, where the San Gabriel River sinks, and fills the plain with moisture. Sixty bushels to the acre is considered a large crop; the average is not over thirty. Corn can be grown wherever the land can be irrigated, but this is a troublesome and expensive mode of cultivation, though it is not uncommon in gardens near San Francisco. Green maize, grown in the open air, is in market from June to September.

The cultivation of rye and buckwheat differs little from that of the same grains in the Eastern States.

§ 165. *Potatoes.*—The potato thrives wonderfully in a few places in California, particularly at Bodega, Tomales, and in Pájaro Valley. The produce per acre is, perhaps not larger than in Ohio or England, but the tubers are larger and smoother. The average size of those sold in the San Francisco market is probably fifty if not one hundred per cent. larger than of those sold in New York. Potatoes six inches long by three inches through, and weighing a pound, are not uncommon; many have been seen to weigh four pounds, and one grew to weigh seven pounds. I saw a cluster that had grown together, eight inches long, six wide, and four deep, that weighed eight pounds. A San Francisco paper of December 31st, 1872, mentions a sack of potatoes—about 120 pounds—every potato weighing three pounds or more. They were from Pájaro Valley. The larger specimens were a foot long, four inches wide, and two and a half inches thick.

The soil at Bodega and Tomales, the chief potato districts, is a light, sandy loam, and the mists from the ocean supply the abundant moisture which the plant loves. The potato district of Sacramento County is on the banks of the sloughs of the Sacramento River, near its junction with the San Joaquin. The soil is very light, warm, rich loam, and the vegetables grown there are among the earliest in the market. The Californian potatoes are mealy, sound, and palatable; yet in the opinion of many travelers, inferior in flavor to those grown east of the Rocky Mountains. The potato-disease has never made its appearance in this State.

The immediate coast, at least north of Point Conception, is too cold for the sweet potato, which thrives, however, in the Sacramento Valley, especially in the lowland about the head of Suisun Bay. The true sweet potato has grown here to weigh fifteen pounds—much larger than any I have ever seen in the States east of the Mississippi. They lack the mealiness and delicate taste which makes the Eastern sweet potato so palatable in its season.

§ 166. *Hay.*—As most of our farm animals are never brought under shelter, and never fed at a trough, rack, or stack, the proportion of hay cut here is much less than in the Atlantic States and Europe—probably not more than one-half as much. There every horse and cow must have hay throughout the winter, and many of them through the summer; while here very few cattle are fed with hay at any season of the year, and horses not employed are usually turned out into the open plain. The hay of Ohio is cut in cultivated fields from tame grasses; that of California is made of wild oats and indigenous grasses, grown in the open valleys, or of wheat, barley, or oats, cut while they are green, usually when the grain is in the milk. If the season threatens to be so dry that the field will not pay for harvesting the grain, then the mowing machines are started, and the stuff is saved for hay.

The haying season comes about the first of May. The old adage that "you must make hay while the sun shines," does not apply in California, for here the sun shines all the time, and the haymaker has ordinarily no fear of rain. It happened, however, in 1860, that a considerable amount of hay was spoilt by the late rains in June. The whole process of hay-making in California is managed by machinery. It is cut with the machine-mower, raked together with horse-rakes into windrows, and finally hauled together on hay-sleds, which load themselves by slipping under the heaps or windrows. The hand must be used, however, when wagons are to be loaded or stacks built. Hay is usually cured in the windrow. It is not necessary to turn it by hand, as is customary in the Eastern States. One turning and one day in the sun are enough, when it is raked together, and is ready for the stack or the mow. In Ohio a good field of timothy will yield four tons of hay to the acre; in California the wild oat stands so thick in a few places as to yield as much, but the average crop is not over a ton to the acre.

Tame grasses occupy at present a very small place in the agriculture of California. Not one-tenth of the farms in the State have an acre of cultivated pasture; and even in the largest farms, containing from three hundred to a thousand acres under plough, it is rare to find a field of timothy, clover, or alfalfa. The last mentioned, known also as lucerne, will probably become the principal grass grown in the State, since it is peculiarly fitted to thrive in our climate and soil.

§ 167. *Hops.*—The hop grows luxuriantly and produces abundantly in California; and indeed there is good reason to doubt whether any country has a climate and soil more favorable to it than ours. We have no heavy dews or showers in summer to wash off the dust which contains the strength of the flowers, or to cover the plant with blight. The failures of crops from these causes, so frequent in England and the Atlantic States, would never occur here. Not only is the crop certain, but it can be cured with more ease and in better condition than in other countries. The moisture of the air in England compels the hop-growers to dry the flowers in the sun or in kilns; and if a rain fall upon them while drying, they are ruined: and they are injured by both the sun and kiln-drying. In California, they may be dried in the open air, under sheds; and thus prepared they will be superior to any of the European hops.

§ 158. *Tobacco.*—The cultivation of tobacco has been attempted, on a small scale, every year since 1853; but the product was so small, previous to 1872, that it was scarcely worthy of notice, and the business seemed to have no importance for the future of the State. Now, however, it promises much, chiefly on account of certain discoveries made in the art of curing the plant, by J. D. Culp, who obtained patents for cigars and chewing tobacco, and transferred them to the American Tobacco Company, which in 1873 had 400 acres in tobacco, an area not equaled by any other company or cultivator in the Union.

In curing cigar tobacco, the plant, instead of being hung up vertically by the butt in a barn, according to the old method, is by the Culp method taken into a close building, and there put in piles two feet high, and allowed to remain ten hours or more, until a temperature of about 100 degrees is reached; then hung up horizontally until the surface moisture on the leaves dries, perhaps two or three days; then piled again till they reach a heat of 100 degrees, usually twenty-four hours; and hung ten days or more till dry, and finally stacked. When the plants are put into piles the second time, some leaves are green, and others yellow, and the green come out yellow, and the yellow is converted into brown; and in the third piling all assumes the brown color. The stacking in bulk, for six months, gives mellowness to the flavor, and brightness and uniformity to the tint. The curing, previous to stacking, can be done in six, and sometimes in three weeks. The fermentation is indispensable, and to secure this, the house must be tight, and must be provided with heating apparatus, and the temperature inside must never fall below seventy degrees.

Chewing tobacco is hung in the field, on portable racks, soon after cutting, and allowed to remain a week or more, till the leaves are yellow in general color; then piled on the ground two feet deep (for perhaps twelve hours) till the fermentation causes a heat of 110 degrees; then hung on the racks again, until the leaves and stalks are dry; and finally stacked, ready for the manufacturer.

There are two main new ideas in Mr. Culp's processes—on is hanging horizontally, and the other is fermentation in piles. The advantages claimed are that the tobacco is better in quality than any other cured elsewhere; that it is more uniform in quality, and that there is none of the great damage that frequently results from very dry or very wet weather in the curing season in Cuba and Kentucky. On account of the dryness of the atmosphere, the old style of curing would never have been profitable here. Besides, under the system of hanging vertically, the butt up, the sap in the stalk could not run into the leaves, and the leaves resting upon each other could not dry evenly, thus causing great losses.

The climate of California is very favorable to the growth of the plant, and a large area will probably be cultivated in tobacco in a few years. The growing season being much longer than on the Atlantic side, the plant after having been cut down grows up again, and thus produces two crops of chewing and four of cigar tobacco from the same stalk. The total average yield per acre is 3,000 pounds of cured chewing, and 2,200 pounds of cigar tobacco. The old style of curing costs three times as much as the Culp method; the quality is inferior and the yield less.

§ 169. *Cotton.*—About two thousand acres are cultivated in cotton in California. The ordinary yield ranges from 250 to 500 pounds per acre; and as the price is twenty cents per pound, the product is much better adapted to shipment for long distances, than wheat at two cents a pound. The expense of making the crop is about $30 per acre, including $3 for rent, $2.50 for seed, $2 for planting and cultivating, $20 for picking, ginning, and baling, and $2.50 for sundries. As the lowest yield in an ordinary season is $50 per acre, with a good chance for $100, there is a nice margin for profit. The cultivation of cotton has been increasing steadily for the last four years, but its importance for the future depends to a great extent on the irrigation works. When the water is supplied to the San Joaquin Valley, cotton will probably claim a large area as the most profitable crop.

§ 170. *Kitchen Vegetables.*—The vegetables for the kitchen —such as cabbage, cauliflower, beets, parsnips, carrots, radishes, onions, melons, squashes, pumpkins, green peas, string-beans, tomatoes, asparagus, rhubarb, okra, cucumbers, lettuce, garden-egg, and so forth—thrive in California, many of them beyond example elsewhere. Cabbages weighing fifteen pounds are wonders in the New York market; in San Francisco they are common. Whole fields of cabbage-heads, weighing twenty pounds each, have been grown; and hard, solid heads, with no loose leaves, weighing forty-five and fifty-three pounds each, are on record. One cabbage, which did not make a head, grew to be seven feet wide, throwing out leaves three and a half feet long on each side. In many cases the cabbage has been converted into a perennial, evergreen, tree-like plant, by preventing it from going to seed. Several of these are now growing in the State, with stalks from two to six feet high, and a foliage that grows through winter and summer.

The largest squash or soft-skin pumpkin produced in California weighed two hundred and sixty pounds, and the vine which bore it had several others weighing over one hundred pounds each; the total weight of its fruit being more than eight hundred pounds! Elsewhere, sixty pounds is a very large pumpkin or squash; and there is scarcely a record in the Atlantic States of a greater weight than one hundred pounds, which has been frequently surpassed here. In 1857, one squash-vine on the ranch of James Simmons, in Yuba County, produced one hundred and thirty squashes, weighing in all twenty-six hundred and four pounds! In the same year, J. Q. A. Ballou, at San José, grew two squashes, weighing two hundred and ten and two hundred and four pounds respectively.

The largest Californian onion weighed forty-seven ounces avoirdupois, and measured twenty-two inches in circumference. Our onions generally excel those of the Eastern States in size and weight.

Our largest red beet, (a mangel-wurzel) weighed one hundred and eighteen pounds—was five feet long, and a foot in diameter. It was three years old. The first year it grew to weigh forty-eight pounds, and because of its large size was reserved for seed; but it disappointed its owner, and, instead of producing seed the next year, merely kept on growing, and reached the size of eighty-six pounds; and the following year got to a hundred and eighteen. Such beets can be grown in abundance. A beet of twenty pounds is a wonder in New York or London; here it is too common to attract more than a glance. Beets are frequently three feet long, so that it requires no little trouble to dig them out.

Our largest common white turnip weighed, I believe, twenty-six pounds; our largest carrot, ten pounds; our largest watermelon, sixty-five pounds. Our largest tomato measured twenty-six inches in circumference.

Our kitchen vegetables, grown in the open air, are in the market during a greater part of the year than in any State east of the Mississippi. We have cabbage, cauliflower, lettuce, turnips, beets, carrots, parsnips, radishes, horseradish, celery, green onions, leeks, salsify, and parsley, throughout the year;

green peas, string-beans, water-melons, cantaloupes, and nutmeg-melons, from June to November; tomatoes from May to October; garden-eggs, green okra, Lima-beans, and Californian sweet potatoes, from July to September; asparagus from March to June; and rhubarb from April to July—the months being meant inclusively in every instance. These seasons for the different species of vegetables are, on an average, twice as long as the seasons on the Atlantic slope of the continent in the same latitude. Our tables are thus supplied with a great variety of fresh and wholesome vegetables throughout the year. Another advantage of our climate is, that garden vegetables may be left in the ground all winter. Potatoes are sometimes not dug until the first of January, and turnips and beets are usually left in their beds until they are to be sent to market; there is never enough cold to freeze them. Potatoes are never buried, but after they are dug are piled up in bags under a shed, or are placed in a storehouse.

The cabbage likes a moist air and soil, and thrives best along the coast, from Bodega to Santa Cruz. The melons and tomatoes like a warm climate, and thrive best in the Sacramento Valley—and Putah Valley, which is tributary to it—where many of the early vegetables for the San Francisco market are grown

§ 171. *Fruit.*—As a fruit-growing State, California takes a high position. In this particular, as in so many others, her climate gives her great advantages. In no part of the world do fruit trees grow so rapidly, bear so early, so regularly, and so abundantly, and produce fruit of such large size. Nor is there any other country where so great a variety of fruit can be produced in high excellence. In the matter of flavor, our apples, peaches, and strawberries, or most of them, are inferior to Eastern fruit; in the flavor of other species we are at least equal to other countries. The pear, the plum, the apricot, the grape, and the olive, are peculiarly thrifty, healthy, and productive, as compared with the same kinds of fruit elsewhere.

In the Californian orchards the fruit trees are trained low, the lower limbs being within a foot, or at most two feet, of the ground. Men, therefore, do not walk under the trees in an orchard, or climb after the fruit. One fruit tree in a hundred may be trained high, not more. The advantages of low training are, that the trees bear fruit earlier; the trunk is shaded, and protected against the disease called the sun-scald; the earth about the roots is kept moist; and the trees are protected against the wind.

The trees are planted from one-sixth to one-half nearer together in the orchards than in the Eastern States. This is an additional protection against sun and wind. The ground is ploughed several times every summer, and kept clean; whereas in the Eastern orchards it is common to sow grass or cultivate vegetables. Our apple trees are free from the borers after the first year, and our plum and cherry trees from the curculio, though the plum suffers from the aphis, or louse.

Fruit trees in California are generally as large at two years old as they are in New York at three and four years. The instances of unusually rapid growth here are without parallel elsewhere. Cherry trees have grown to be fourteen feet high in one year; pear trees ten feet high; peach trees to have trunks from two to three inches in diameter. These were all from buds on yearling stocks, and were well provided with branches—not trimmed to gain height. These specimens of rapid growth were observed on an island near the junction of the Sacramento and San Joaquin Rivers. At Petaluma, a cherry tree two years old from the graft, and three from the seed, had a trunk seven inches and three-quarters round; a plum tree, three years from the seed, was eleven feet high, and had a trunk seven inches in circumference; and a peach tree, one year from the bud, was eight feet high and eight and a half inches round.

Mr. E. B. Crocker, of Sacramento, wrote thus in December, 1858: "In January, 1855, I planted a small almond tree, with a stem little larger than a goosequill, and which I cut down within a few inches of the ground. It is now a tree twenty feet high, sixteen feet through the top, with branches starting from the surface of the earth. The body below the branches is twenty-four inches in circumference....A Glout Morceau dwarf pear tree, planted in 1855, when it had grown one year from the bud, is now ten feet high, four feet through the top, and measures ten inches round the body at the ground, branching about one foot from the surface. A Beurre Diel dwarf, planted in January, 1856, is now seven feet high, three feet through the top, and ten inches in circumference at the ground. A dwarf May Duke cherry, planted in 1856, is now thirteen feet high, and thirteen and a half inches in circumference at the ground. An Old Mixon peach, planted in 1855, and cut down within a few inches of the ground, is now twenty feet high, twenty-two feet through the top, and the trunk twenty-eight inches in circumference. A seedling peach, seed-planted in January, 1858, is now eight feet high and well branched, and the trunk four and a half inches in circumference at the ground. The growth of trees, vines, and shrubs, is about double that of similar kinds on the rich prairie-soils of Northern Indiana."

In 1858, a sprig of a peach tree, a foot long, was stuck into the ground on the Bay-State ranch; the next year it bore fruit. It may be set down as a general rule that, previous to the time of bearing fruit, trees in California make twice as much wood in a year as they do in the Middle States.

In Alameda County, plum trees have grown twelve feet in one year from the bud.

The trees commence to bear fruit at about half the age at which they bear in the Atlantic States. An apple orchard in New York begins to bear in its fifth or sixth year; in California, in its second or third.

The variety of climates, and the freedom from frosts, severe cold, and furious storms, protect us against a failure of the fruit crop.

Our apples, pears, apricots, and plums, are larger than the same varieties usually are elsewhere; other fruits are about the same in size.

Dried fruit will probably in a few years occupy a large place among the productions of California, including raisins, figs, prunes, plums, apricots, peaches, apples, pears, and currants. At present, the Alden process of drying is considered preferable to any other.

§ 172. *Abundance of fruit.*—Of the temperate fruit trees California has about 4,000,000, including 2,446,000 apple, 835,000 peach, 356,000 pear, 243,000 plum, 122,000 cherry, 78,000 apple, 31,000 nectarine, and 19,000 prune. Of the apple kind, including apple and pear, there are 2,800,000; and of the peach kind, including peach, apricot, and nectarine, 930,000, and the two classes together make up more than ninety per cent. of the whole number.

Of the sub-tropical fruit and nut trees we have 250,000, including 59,000 almonds, 58,000 walnut, 50,000 fig, 38,000 orange, 38,000 olive, and 7,000 lemon.

Besides these, we have 26,000,000 grape vines, 12,000,000 strawberry vines, and 1,000,000 raspberry bushes. In all, we have 37,000,000 trees, vines, and bushes, bearing fruits or nuts, under cultivation, covering an area of more than 100,000 acres, or nearly half an acre in fruit for every man in the State.

The trees generally are healthy and in good condition. Our cherries and plums are not troubled by the curculio, and our apples are free from the worms which abound in the Eastern orchards.

§ 173. *Grape.*—California is a favorite land of the grape; and indeed many of our vine-growers suppose it to be the best grape country in the world. The grape region of California extends from the southern boundary, at latitude 32° 30′, to 41°, a distance of five hundred and ninety-five miles from north to south, with an average breadth from east to west of about one hundred miles. The number of grape vines in the State is 30,000,000, including in round numbers 4,000,000 each in Los Angeles and Sonoma, 2,000,000 each in Napa and Sacramento, 1,500,000 each in El Dorado, Solano, and Tuolumne, 1,000,000 each in Santa Clara and Amador, and 800,000 each in Butte, Placer, and San Joaquin. The basin of San Francisco Bay, west of the Diablo ridge, has 9,500,000; the low land of the Sacramento Basin, 7,500,000; the coast, south of 35°, 5,200,000; and the Sierra Nevada has 8,000,000. A large majority of the vines are planted in bottom lands, where the vines can be started and cultivated with least inconvenience, and where they bear most abundantly.

§ 174. *Large vines and vineyards.*—The grape vine supposed to be the largest in the world, grows at Montecito, near Santa Barbara. It is of the Los Angeles variety, was planted in 1795, has a trunk 15 inches in diameter, and its branches are supported by an arbor 115 feet long and 78 feet wide. It has in a favorable year borne four tons of grapes, but is now losing its vigor and will probably not live much longer. The State has a number of other large vines, some of which bear 2,000 bunches annually, and threaten to rival the old vine at Montecito.

The largest vineyard of the State is that of the Buena Vista Vinicultural Association, which has 300,000 vines near the town of Sonoma. B. D. Wilson, at San Gabriel, has 200,000 vines; L. J. Rose, near the same place, 130,000; Matthew Keller, at Los Angeles, 100,000; the Orleans Hill Vineyard Company, in Capay Valley, 36 miles west of Sacramento, 100,000; R. Chalmers, at Coloma, 100,000; S. L. Wilson, near Sacramento, 75,000; B. N. Bugbey, near Folsom, 100,000. The figures for many other large vineyards are lacking. Most of these vineyards are planted with 700 or 800 vines to the acre.

§ 175. *Varieties.*—The vine was brought to California by the Spanish missionaries, about the year 1770. So far as is known, only one variety—that now known as the Los Angeles grape—was brought by them in the last century. It is the vine found in all the old vineyards, and in most of the new ones south of the bay of San Francisco. The berry is round, reddish-brown while ripening, and nearly black when fully ripe, about three-fourths of an inch in diameter at its largest size, covered by a strong skin, possessing an abundance of thick and very sweet juice, with little meat, but with no fruitiness of flavor. It has been asserted that this grape is of the Malaga variety; but if so, it has changed so much—perhaps while under cultivation in Mexico, whence the first cuttings that came to California were probably obtained—that it no longer resembles its parent stock.

About 1820, when the missions were established north of the bay of San Francisco, a new variety, now called the Sonoma grape, and said by General Vallejo to be of the Madeira stock, was introduced. It is now extensively cultivated in Sonoma and Napa Counties and in the Sacramento Valley; it is also found in a few vineyards south of the bay of San Francisco. The berry is bluish-black in color; is covered, when ripe, with a grayish dust, which brushes off, leaving a glossy, smooth skin; is about half an inch in diameter at its largest size; has a thin, sweet juice, with more meat and a little fruitiness of flavor.

The Sonoma grape makes a light wine, resembling claret; the Los Angeles grape makes a strong wine, resembling port and sherry. The two grapes are classed together as the "Mission," "Native," or "Californian" grapes, and were the only varieties cultivated here previous to 1853. In that year the importation of foreign grapes commenced, and now about two hundred varieties are cultivated. The Mission grapes are hardy, healthy, long-lived, productive, and early in coming into bearing; but they are surpassed in flavor, hardiness, productiveness, earliness of ripening, and earliness of bearing, by many foreign varieties, which are not inferior in any respect.

There were probably two hundred thousand bearing vines in the State in 1848, and they still continue productive. Very little was done to increase their number until 1856, and then the business of grape-growing and making wine for the market was commenced. The new vineyards then set out were planted with Mission grapes, the only varieties of which cuttings in large quantities could be obtained. A few foreign vines had been imported in 1853, '54, and '55, by nurserymen, but there was little demand for them. When it became clear that California would produce wine largely, the foreign varieties came into demand. It was not until 1859 that the superiority of the foreign grapes, as a class, over the Mission grapes, was established by trial.

About two hundred varieties of grapes are cultivated in California, including the most noted stocks of Spain, France, Germany, Hungary, and the Eastern States. All of them thrive as vines, but most of them do not give satisfaction, either for productiveness or flavor, and are therefore not multiplied. In the Eastern States the European vines will not live in the open air, the winters being too severe for them; but here we have most delicate varieties from Spain and Morocco, side by side with the Catawba and Isabella.

Flavor is a matter of vast importance in fresh fruit, and the want of it is the great defect of the Mission grape, which will not command more than one-third of the price of the best foreign varieties in the San Francisco market. For wine, the foreign grape has an equal or still greater advantage. Flavor and fruitiness are not less needed there than in fruit to be eaten fresh at the table. The lack of delicate flavor is one defect of the wine made from the Californian grape, and the evil can only be remedied by the use of the foreign stock.

For wine, the Zinfindel, Berger, Riessling, Black Malvoisie, German Muscat, French Muscat (of Frontignan), Burgundy, Golden Chasselas, and Fontainebleau Chasselas, are in most favor. The white Muscat makes the best raisins; the French Muscat the best vinegar. We have no statistics of the different kinds; but most of the vineyards planted in the last seven years are of European varieties, which now probably amount to more than one-fourth of all the vines in the State.

For the table and for raisins, the Muscat of Alexandria is more prized here than any other grape, on account of its large size, and rich, spicy flavor. It does best on a gravelly loam, mixed with a little clay, and bears very poorly in rich clay loam without sand or gravel. The most productive Muscat vines are in the Sonoma Valley. In good years it yields 9,000 pounds to the acre, and the average wholesale price is 7 cents per pound, making a gross yield of $350 per acre, of which $50 may be counted for cultivation, picking, and sending to market. One of the chief objections to this grape is that in many places it does not "set" well, and then the only way to secure a good crop is to pull off some of the blossoms, and shake the pollen over other blossoms which are left to bear. The vine generally starts out to produce two crops every season, but the careful vineyardist plucks off the second set of blossoms, for otherwise neither crop would ripen properly. The Alexandrian Muscat is the only grape that is good for wine, first-rate for the table, for raisins, and for long transportation.

The Flame Tokay is prized for its fine appearance, and for its excellent keeping qualities; but it is useless for wine, and has little flavor. It bears more than the Muscat of Alexandria, and has hitherto commanded the same price in the market. It may come into demand in the Eastern States. The Queen of Nice differs so little from the Flame Tokay, that by many it is regarded as the same grape.

The Rose of Peru is a large firm grape, of fine flavor, yielding in good years 12,000 pounds to the acre. The price is about 6 cents per pound, but the inferior price is compensated for by the superior yield as compared with the varieties previously mentioned. The Black Hamburg is large, fine in flavor, and well suited to transportation, but inferior to the Rose of Peru. The Isabella and Catawba, several Muscatels, and some varieties of the Chasselas, are good for the table, but they do not bear shipment well. The Zinfindel, Malvoisie, Riessling, Black Burgundy, and Traminer, are excellent for wine, but are not in demand for the table. The Mission grape, especially when grown in the Los Angeles district, is very rich in sugar if plucked soon after ripening; and if left on the vine till November, the sugar changes to spirit, so that it becomes highly vinous, and is for that reason preferred by some persons; but it could not be transported from the Southern Coast to the Mississippi Valley with profit, although it could be obtained in any quantity at 2 cents per pound.

§ 176. *Advantages.*—The advantages of California for the cultivation of the grape are the following:

1. Californian vineyards produce ordinarily twice as much as the vineyards of any other grape district, if general report be true. Here, twelve thousand pounds of grapes per acre is a crop as common as six thousand in France, Germany, or Ohio. Why our vineyards should produce so much more than those elsewhere I know not, but the fact is indubitable. Crops of twenty thousand pounds per acre have been seen here.

2. The grape crop seldom fails, as it does in every other country. This is owing partly to the fact that we have no severe frosts, no hail, and no storms of rain and electricity from the time the vine buds until the grape is gathered, each of which often causes a total loss of the crops in Europe. There is abundant time for gathering the grape; while in other vine countries the rain and frost destroy the fruit after it is ripe. The *oïdium*—the disease which has done such great damage in France—appeared in 1859, but has done little injury here. Certain kinds of bugs and insects, which do much harm in European vineyards, have never appeared in California.

3. Vineyards in other countries require more labor than in California. In Europe, the vine is trained with a stalk four feet high, and supported by a pole, which has to be set down every year, and to which the vine is tied. Here the stalk stands alone.

4. The equability and warmth of the climate render it easy to make wine by fermentation without artificial heat, whereas, in many other grape countries, fires must be kept up in the cellars through the winter.

5. The great variety of grapes which thrive here as compared with every other grape country.

The disadvantages of California consist in the high price of labor, the bad situation of many of the vineyards, the ignorance of the people of the arts of wine-growing and wine-making, and the dearness of casks.

Land suitable for vineyards costs from twenty to one hundred dollars per acre, whereas it is worth from two to four hundred in France; but there is a counterbalancing difference in the interest of money.

§ 177. *Vine-planting.*—The vine likes a sandy or gravelly (not very moist) soil, and never thrives in wet, loamy, or stiff clay soil. In California, nearly all the vineyards are planted on flat land; in Europe, hills are preferred, and in Germany the name for a vineyard is "weinberg"—a vine-hill.

Vineyards are planted with cuttings or with rooted vines. The cuttings are obtained at the annual pruning, in January or February, are about thirty inches long, and are all of wood less than a year old. They should be taken from vines not less than four years old. The rooted vines are cuttings which are planted in the nursery and allowed to grow there through one season. These latter may be planted out from November to March, inclusive; cuttings from January to March. It is not usual to plough more than once before planting, but several ploughings would be better. The vines are planted either six and a half or eight feet apart each way: the former distance, giving one thousand vines to the acre, is customary at Los Angeles; the latter, giving six hundred and eighty vines to the acre, is preferred in Sonoma and Napa. There is, however, no regularity in the vineyards planted of late years; in some places the rows are five feet apart, and the vines three feet apart in the row. The plough is always used in cultivation, and it requires six feet for convenience of handling. The cuttings are set a foot or two feet deep, perpendicularly, leaving three or four inches with two buds above the surface. The holes are usually made with a crowbar, and after the vine is thrust down into it, a little loose sand or pulverized dirt is poured in to fill up the hole. Sometimes holes are dug with the spade. Unless the ground is moist, the newly-planted vineyard is irrigated, if water can be obtained readily; for the vine, when taking root, likes water. During the first year after planting, the vine-grower has nothing to do save to plough several times, and to hoe down such weeds as cannot be reached with the plough; and to irrigate twice if he has water. The cuttings, if properly set, will all grow in a favorable season without irrigation; but a supply of water about a month after the last good rain, and another supply a month later, will double the growth of their roots.

There is very little growth of wood the first year, but it frequently happens that cuttings bear grapes—one bunch, it may be, to a dozen vines. Rooted vines do not bear the first year. The next year the ground should be kept loose and clean by ploughing and hoeing twice or thrice. Any suckers springing out from buds beneath the surface must be broken off, and a little pruning is done. In pruning, regard is had to the form which the stalk is to have.

The vine bears fruit on new wood; that is, on twigs produced in the same season with the grape. All the twigs are cut off every year, leaving a bare stalk. In the old vineyards of California the stalks are from three to five feet high. Of late, the more general custom is to make the stalks about fifteen inches high. It is observed that the nearer the grapes to the ground, the earlier they ripen, and the less liable they are to injury from frost and wind. The strongest shoot is selected to make the stalk, and it is tied to a little stake stuck into the ground at its side, and the other shoots are cut off. It is a matter of importance to use the stake so that the vines may grow straight up. Vineyards planted with cuttings bear no grapes the second year; those planted with rooted vines may bear a few.

The third year, the ploughing and hoeing is the same as the second. More attention must be given to the pruning. All the twigs are cut off save two or three, which sprout from the top of the stalk, and these are pruned so as to leave but two buds on each, which are to produce all the wood and fruit of the season. This year the vines should produce three or four pounds of grapes each; some vineyards have averaged twelve pounds to the stalk the third year.

The fourth year, the five or six twigs all starting from the top of the stalk, are left with two eyes each; and this year the yield should be six or eight pounds per vine. The fifth year, there should be seven or eight twigs, with two eyes each, and the grape-yield should be ten pounds per vine. The sixth year, the vine is in full growth, and there should be eight or ten twigs, and from ten to fifteen pounds of fruit per vine. About the fortieth year the vine begins to decay. After the third or fourth year, if the vine has been well trained, it needs no stake for support, but stands alone.

All vineyards do better with irrigation during the first three years; many of them do better without it afterwards. On the coast, south of 35°, most of the old vineyards are irrigated; and nearly all of them are planted in places where they can be irrigated.

§ 178. *Wine Yield.*—According to the State Reports, the total production of Californian wine was 4,542,000 gallons in 1871; 3,700,000 in 1870; 2,000,000 in 1869; 2,600,000 in

1868; 1,800,000 in 1867; 800,000 in 1863; and 400,000 in 1860. The yield in some vineyards has been a gallon to the vine, but we could make a gallon to two vines without deducting anything for the late plantings; so that really the State has the capacity to make 13,000,000 gallons of wine in a year. At present, however, many of the grapes are eaten at the table; others are converted into brandy, strong wine, raisins, syrups, and vinegar, and some have been allowed to go to waste. Many new vineyards have come into bearing within the last five years, and the owners have neither learned how to make wine, nor found a market for it after it is made; so that, though there has been a rapid increase absolutely in the production of wine, yet in relation to the supply of grapes there has been a decrease. Of the 3,700,000 gallons made in 1870, Los Angeles supplied 1,000,000; Sonoma, 750,000; Napa, 297,000; Solano, 284,000; Placer and Sacramento, each 170,000; Calaveras, 136,000; and Santa Barbara and El Dorado, each 100,000.

§ 179. *Wine-making.*—The making of wine is considered a branch of agriculture. Grapes cannot be transported far without much loss and expense, and usually those intended for wine are pressed in the vineyard where they are grown. A few persons having vineyards of their own, and being provided with machinery and cellar-room, buy the grapes from adjacent vineyards not so well supplied. In all wine countries it is the general custom that the owners of the vineyards should press the grapes, and take care of the must until it has passed through its first fermentation. Here they do not sell the wine until it is at least six months old.

Wine-making commences with the ripening of the grapes, about the middle of September. The berry is considered to be fully ripe when the heart has taken a tinge resembling the darkness of the skin; when the berry is perfectly sweet, and comes off easily from the stem, leaving no juice upon it; and when, on holding a bunch up to the sun, the fibers running from the stem into the berry are nearly or quite invisible.

The branches are cut off with a knife, (after the dew or fog, if any, has been dispelled) put into a basket, and carried to the press. Here the rotten and unripe berries should be picked out before the bunches are thrown upon a coarse wire sieve. A man presses the bunches upon this sieve, through which the grapes fall, some broken and others unbroken, while the large stems and leaves will not pass, and are thrown away. Below the sieve is the masher, composed of two rollers, ten inches in diameter and three feet long, made of iron or wood. These rollers, turning toward each other, crush the berries, but do not bruise the seeds, which, if crushed, would give a bitter taste to the wine. In large establishments a machine called a stemmer is used to tear the berries from the stalks before they go to the masher; and the grapes are thrown from a wagon with a pitchfork into a hopper that feeds the stemmer.

The stemmer and masher together crush all the grapes, and the best part of the juice is liberated before the press is reached; and that which runs first from the grape is better than the last squeezings. Usually the fresh juice of all grapes is free from color; and when red wine is to be made, the crushed grapes, as they come from the masher, are thrown with their juice into a vat, and allowed to stand six or eight days, at the end of which time the alcohol formed by fermentation has dissolved the resinous coloring matter in the skin of the grape, and then the pressing can be done.

§ 180. *Fermentation.*—After the pressing, the red and white wines are treated in the same manner. The juice is put into large casks, usually those of one hundred and forty gallons each, and about one hundred and fifteen gallons are put in each. The casks are thus not filled entirely, but a considerable surface of the wine is left exposed to the air. This is to favor fermentation, to which the atmosphere is necessary. The cask lies upon its side, the bunghole is left open, and in three or four days the fermentation begins; in three or four more, its period of greatest activity has passed. The temperature is a matter of the utmost importance to fermentation, the proper degree being about 65° Fahrenheit; and if the liquid be kept either warmer or colder than that figure, it will be in great danger of spoiling. The fermentation is accompanied by a rising of little air-bubbles to the surface, where they burst, making a noise that may be heard by applying the ear to the bunghole, and which is sometimes so loud as to be heard in the cellar at a distance of ten or twenty feet from the barrel.

After the fermentation has been in progress three or four days, the wine-maker pours in six or eight gallons of fresh juice every day, until the cask is full; and for several days after that he leaves the bunghole still open, and throws out all scum that rises to the surface there. When the scum has ceased to rise, the barrel is closed, and not disturbed for a period which should not be less than three weeks nor more than three months. After this, comes the "racking off." All the liquor, except about four inches at the bottom, containing sediment, is drawn off through a syphon, or a cock placed above the level of the sediment. The remainder is filtered through a doubled cotton cloth, and is then poured in with the clear liquor, or used in making brandy. The sediment deposited in the bottom of the cask within the first three months, is about one-twentieth in weight of the juice as it comes from the press. After the first racking, the new cask is filled up, the bung is put in, and the wine is not disturbed till March or April, when it begins to feel a more lively fermentation, for that process never ceases entirely.

It is said that the wine sympathizes with the vine, and that whenever the latter is in active development, the former feels a peculiar impulse also. Thus, the periods when the vine sprouts in March or April, when it blossoms in June, and when the grape ripens in September, are also the times when the fermentation is the most active. At those seasons the bungs must be taken off, or at least loosened, and the barrels must not be moved.

It is an important point with wine-makers to avoid disturbing the process of fermentation. Between times, when the wine is at rest, it should be racked off, and placed in a clean cask. At the end of a year and a half, good, dry, still wine has become clear; but it continues to grow better with age for about a score of years, at the expiration of which period it has acquired a mellowness and delicacy of flavor, and an oiliness of consistency, which neither gain nor lose by longer preservation.

In making wine, much depends on the management of the fermentation. The grapes should not be pressed until they are between 55° and 70° warm, and it is very important that the first fermentation should not be checked by cold, which frequently interferes, whereas natural heat very seldom does.

§ 181. *Kinds of Wine.*—California makes many kinds of wines, the chief classes being the dry, the sweet, the still, and the sparkling, the Mission, and the foreign. Dry wine is that in which the sugar of the grape is all, or nearly all, converted into alcohol. In other words, the process of fermentation has been carried through to completion. Claret, Sauterne, and the light wines generally, are dry, and they are preferred by connoisseurs, because they can be drank in considerable quantities without either cloying the palate or confusing the head, and because it is easier for the practised taste to detect adulterations.

The sweet wines are those which contain part of their sugar unchanged; and, usually, fermentation has been arrested in them by either allowing the grapes to become over-ripe, and thus extremely rich in sugar, or by mixing brandy with them. The ordinary ports, sherries, and madeiras of commerce, are sweet wines, or imitations of them; though the Spaniards of the Jerez district, and the Portuguese near Oporto, drink dry port and sherry, whereas those wines designed for the English market are fortified with distilled liquor. Sweet wines usually have from fifteen to twenty-five per cent. of alcohol in them, whereas dry wines have ordinarily from eight to fourteen per cent. The larger the percentage of alcohol above ten, the slower the fermentation; and when port has twenty per cent., it may be kept for weeks in the open bottle in a temperature of 70° with very little perceptible alteration; whereas a light, dry wine will begin to turn in a day. Our principal sweet wines are the Californian, ports, sherries, and Madeiras.

The still wines are those which do not effervesce when the bottle is opened, and they include all the strong wines. The sparkling wines are those which effervesce when the bottle is opened, as sparkling champagne.

Sometimes water is thrown on the cheese as it comes from the press, and after standing a couple of days it is pressed again, to make a very light wine called "Piquet."

Wine is defined to be "the fermented juice of the grape," and therefore "Angelica" is not properly a wine, though it is usually classed under that title. It is very sweet grape juice, preserved from fermentation by brandy, and is considered a proper drink for ladies, though it contains twice or thrice as much spirit as dry wine. There are many ways of making it: one is to mix a quart of brandy with a gallon of fresh grape juice; another, to boil the grape juice down to half its bulk and add an eighth of brandy; another, to let the grapes shrivel on the vines, and add a tenth of brandy to the juice, and so on; and it is said that some is made without any brandy.

§ 182. *Defects of our Wine.*—Most of the wines of California are strong, lacking in delicacy of flavor. The climate in the Sacramento basin, and on the coast, south of 35°, is so warm that light wine cannot be made conveniently. After ripening commences, it proceeds so rapidly that before much work can be done, an excess of sugar is produced. Spain, Portugal, and Italy make strong wines, while the valleys of the Garonne, Marne, and Rhine, farther north, supply a lighter article. The correction of this evil is to commence pressing as soon as possible after a sufficient quantity of sugar has been developed to give eight or ten per cent. of spirit in the wine. The defects of flavor are partly owing to the bad situation of the vines, their bad quality, or the bad management of fermentation. The low lands in which most of the vineyards are planted, though they can be cultivated with little trouble and produce most abundantly, will not give the best wine. The hills are better for quality, though worse for quantity. The main stock of our vines is of the Mission variety, which bears abundantly, and yields a berry rich in sugar, sometimes turning partly to alcohol on the vine, so that a person with a sensitive stomach will get dizzy from eating a large bunch of grapes; but it lacks aroma and tartness, both of which are necessary to high excellence. Many of the foreign varieties contain less sugar, more aroma, and more tartaric acid; and they are gradually replacing the others, being set out in all the new vineyards, and in some places being used for grafting the old ones. The defects of fermentation are chargeable to lack of experience and of good cellars.

The cellar is a matter of great importance to the wine-maker. From the moment when the grape juice comes from the press until the wine is brought upon the table to be drunk, it should be kept in a cellar; and it is only in a cellar that the equability and coolness of temperature proper to favor fermentation can be obtained. In France and Germany, it is often necessary to have fires in the cellars; and it would be well to have them occasionally in California. Indeed, wine-makers generally have no cellars, but only houses. In Los Angeles County, much of the wine is kept in adobe houses. The sandiness of the land, the frequent irrigation, and the proximity of the vines to the places where the wine is stored, would lead to the filling of deep cellars with water; so the cellars are dug only three or four feet into the ground, and an adobe wall three feet thick, and a thick covering, render the cellars pretty cool. In Sonoma, the Buena Vista Society has a cellar dug like a tunnel a long distance into a hill of volcanic tufa.

While most of the wine of California does not deserve commendation, much of it compares favorably with fine qualities of European production. There are considerable quantities of Californian port, light red wine, and sparkling wine, that can compare on fair terms with good brands from Oporto, Bordeaux, and Rheims; and the amounts are steadily increasing.

At present, nearly all the best light wine comes from Sonoma; but I think the time is not far distant when a large area on the coast mountains from Clear Lake to Santa Barbara, near the line between the foggy coast and the hot interior climate, will be covered by vineyards engaged in the production of light wines of fine bouquet.

§ 183. *Sparkling California.*—California is now making about 200,000 bottles of genuine sparkling wine annually; but if her vineyards were protected by laws enforcing the principles of common honesty, and not oppressed by prohibitory taxes on the distillation of brandy, as at present, they would probably soon produce five times as much wine as they now do. The champagne district of France is not so large as the district fit to produce sparkling wine in California, and it makes 20,000,000 bottles of sparkling wine, and sells them for $12,000,000 annually.

The business of making the machine-aërated sparkling wine is carried on very extensively in the United States, the production amounting to 2,500,000 bottles annually, or as much as the total consumption of the genuine sparkling wines. The bogus article will not keep, and has a bad name; and nearly all of it is offered to the public under fraudulent labels, in imitation of the favorite brands of champagne. Of course, men of high character cannot compete with rogues in such business, and the result is, under our present laws, that honest men are at a disadvantage. So little capital is required for making machine-aërated wine, that the manufacturer may move his establishment four or five times a year to escape detection, and yet throw a large stock on the market. It is said that good wine can be made by machine-aëration, but so long as the business is conducted fraudulently as at present, it would be foolish to expect any excellence in the product. The wine is sold by the forged label, and not by its merit. We want laws making the imitation of a label a crime, and requiring a stamp on imitation articles showing their true quality. Give us proper legislation, and let us see whether we cannot do as well. The sparkling wine of our State is now far above the average of France in quality, and ranks little below, perhaps, half a dozen of the best French; and we are fully prepared now to profit from legislation to protect, not simply home production, but common honesty.

§ 184. *Apples.*—The Spanish Californians had a few apple trees, but they were seedlings of a poor class. The first good apples were imported from Oregon, in 1849; but the varieties were few and the trees did not thrive. Either the stock was not the best, or the change of climate had an injurious influence on them. In 1852 a few trees were imported by way of the Isthmus of Panama; other importations followed very rapidly, and now the State has millions of trees in nursery, and about eight hundred thousand bearing trees in orchard, including two hundred varieties, the best of Europe and the Atlantic States, both standard and dwarf trees.

Apple-trees are usually planted from twelve to thirty feet apart, fourteen or sixteen being the more common distances. This is much closer together than is customary in the Atlantic States: the reason for the denser planting here being to prevent injury by the wind, and to keep the earth moist by shading it against the sun. The apple-tree comes into bearing in the third year in California, about two years earlier than in the Eastern States. It also grows more rapidly, a yearling tree here being as large as a two-year old tree in Ohio. Grafts on yearling stocks have been known to grow six and eight feet in a season—twice as long as similar grafts will grow in the Middle States. The fruit usually grows larger here than elsewhere. The *Gloria Mundi* apple, which elsewhere seldom exceeds fourteen ounces in weight, in California frequently reaches twenty ounces, and some have attained the great size of two and even two and a half pounds.

The climate seems to have a tendency to ripen apples more thoroughly than in other States. Those varieties which are grown for winter use elsewhere, are here generally converted into autumn apples, and only a few will keep to New Year's Day. Our list of winter apples is very short, and some years will pass before we can in this respect equal the Middle States.

The flavor of our apples is not equal, as a general rule, to that of the apples grown on the Atlantic slope. They are less juicy and more mealy. Some varieties, however, are better here than in the Eastern States. Great variations are observed in different parts of the State: an apple may be excellent when the tree grows in the hot summer and cool winter high up on the Sierra Nevada; and be of poor quality if grown in the equable temperature of the coast.

The trees grow so rapidly and bear so abundantly, that some persons suppose our orchards must be short-lived; but the fruit-trees of the old Missions, many of them forty years old, are still in excellent health and full bearing, and have not failed at any season during the last score of years to produce a good crop. The indigenous trees in our valleys have a thriftiness of growth and a precocity of development similar to our cultivated fruit-trees, and yet have a longevity equal to that of the similar species east of the Mississippi, where the summers are shorter, the winters colder, the annual growth less, and the development of the reproductive power later.

The best varieties, so far as ascertained, about the bay of San Francisco, are the Summer Pearmain, Red Astrakhan, Red June, and Early Harvest, for early apples; the Porter, Gravenstein, and Summer Queen, for late summer apples; the Baldwin, Roxbury Russet, and Rhode Island Greening, for fall apples; the Golden Russet, the Northern Spy, the Yellow Newtown Pippin, the White Winter Pearmain, and the Spitzenberg, for winter apples. The best cider apple is the Smith's Cider. In the Sacramento Valley the Newtown Pippin, Swaar, and Rawles Jeannette, are considered the best winter apples; on the slopes of the Sierra Nevada, from 1,000 to 3,000 feet above the sea, the Spitzenberg and Wine Sap are preferred.

Of the apple-trees in the State, there are 1,100,000 in Santa Clara, 260,000 in Sonoma, 90,000 each in Sacramento, El Dorado, and Alameda, 55,000 each in Placer and Napa, and 50,000 each in Santa Cruz, San Joaquin, and Humboldt. Most of the orchards are not profitable, and no large ones have been set out of late years.

§ 185. *Peaches.*—The peach-tree grows very rapidly, comes into bearing very early, and produces abundantly, in California; but suffers with "the curl." The varieties most free from that disease are the Late and Early Crawford, the Late Admirable, and the Smock. In the valleys and near the ocean, the peaches are inferior in size and flavor to the same varieties on the Atlantic slope; but in the Sierra Nevada they are fully equal to the Eastern fruit. The peach does not thrive in the high winds about San Francisco Bay. The trees are usually set out in orchard when one year old from the graft or bud; in the second year after that, they begin to bear.

§ 186. *Pears.*—The pear is the most productive and healthy of the fruit-trees of California. It thrives in all parts of the State, and everywhere its fruit is delicate in flavor and large in size. There are pear-trees at San José which produce twenty-five hundred pounds, or forty bushels each, of fruit annually. The pear was more cultivated by the Spanish Californians than any other fruit; but their varieties were not good, and most of the old trees have been grafted with varieties brought from the Atlantic States during the last eight years. The varieties most prized are the Madeline, Bloodgood, Diane d'été, Dearborn's Seedling, Seckel, and Bartlett, for summer pears; and the Winter Nelis, Glout Morceau, and Easter Beurre, for winter.

§ 187. *Apricots and Plums.*—The apricot thrives well and bears abundantly, especially in the warmer parts of the State. The fruit, however, in some places, is much eaten by bugs and bees. The bugs—some of them of the kind commonly called "Lady-bug," and others similar in appearance and size—eat holes in the apricots before they are ripe; and the bees, which never break the skin, eat at the holes which the bugs have commenced. The apricot-tree is more healthy than the peach, and produces more abundantly; and its fruit supplies the place of the peach in many districts.

§ 188. *Olives.*—For the cultivation of the olive, California has great advantages. The tree is very healthy, and always bears abundantly; whereas in Italy and Greece, whence most of our olive oil comes, the crop is frequently destroyed by summer rains, blight, and insects, all of which causes of trouble are unknown here. There, it is expected that the crop will fail one year in three, whereas here no failure has ever been known. The number of our olive-trees is small, many of those in full bearing having been planted half a century ago. Nor is it likely that there will be a rapid increase. The tree does not come into bearing until ten years of age, at least not in Europe; but it will live and continue in bearing for five or six centuries. Most of the bearing olive-trees are at Los Angeles, San Fernando, San Gabriel, Santa Barbara, San Diego, and San Juan Capistrano. The olive-tree resembles a willow in the form and color of its bark, the shape and proportions of its trunk and branches, and the size, color, and distribution of its leaves. The trees are grown from cuttings or shoots, which latter frequently sprout from the large trees near the surface of the ground. A large olive orchard in full bearing will prove an excellent income, for the fruit and the oil are in demand. One cause of the unwillingness of many persons to plant olives, is the difficulty in getting fine varieties, most of the old stock at the Missions being small and bitter, and not the best either for oil or pickles.

§ 189. *Orange.*—The orange thrives and bears in the Sacramento Valley, as far north as latitude 39° 30′; but along the coast south of 34° 30′ it is one of the most profitable trees, besides being highly ornamental, with its dense, glossy evergreen foliage and fragrant blossoms, and its bright, golden fruit, which covers the trees for a large part of the year. A good tree, ten years old, will bear a thousand oranges annually; and the average price of these, delivered at the orchard, varies from $10 to $30, or $500 to $1,500 per acre. Some trees at Sacramento, Auburn, Oroville, Putah Valley, Sonoma, San Lorenzo, and Martinez, have borne well, but the cultivation has not been extensive enough to satisfy farmers that large orange orchards there would be profitable. More trees, however, are being set out.

We have no exact information as to the time when the orange was introduced into California, nor from what stock the old orange-trees came. Probably the first missionaries brought orange-seeds with them from Lower California, that stock having come from the indigenous trees along the western coast of Mexico. The seeds were planted at various old Missions, such as San Diego, San Fernando, San Juan Capistrano, and so forth. The trees grew, were planted out, bore well, received little attention or cultivation, and some of them are still standing as monuments to the industry and enterprise of the old friars. The orange is at a disadvantage, in being unfit for drying, as grapes and figs are, or for pickling, like olives; and its cultivation is exposed to serious drawbacks, among which are injury by gophers, ground squirrels, and scale bugs, and by dependence on an abundant supply of water. No orange orchard thrives without irrigation, and several orchards in the vicinity of Santa Barbara do not bear, for unknown reasons. Mr. Evans, in the *Overland*

Monthly for March, 1874, thus estimates the cost of ten acres of orange orchard, in the first year, viz: land, $300; fencing, $300; 600 trees, two years old, $125; planting, $300; ploughing, replanting, and other incidentals, $200. Total, $1,425. The trees begin to bear at the end of seven or eight years, but do not yield a good crop until two or three years later. The cost of managing ten acres of orange orchard, in full bearing, is estimated at $3,130 per year, and the receipts at $15,000, leaving $11,870 profit. The soil should be a rich, sandy loam, with good drainage. Adobe soil will not do. Mr. Evans gives the prices of trees in the Los Angeles nurseries: trees five years old sell for $3 each; four years old, $1.50; three years old, 40 to 60 cents; two years old, 3 to 20 cents; one year old, one-half cent; all by the hundred. Imported oranges from the Hawaiian and Society Islands are picked before maturity, thus injuring their flavor, or suffer a loss of fifty per cent on the voyage, giving the domestic oranges a great advantage in the market.

§ 190. *Berries.*—Raspberries and blackberries were cultivated extensively eight or ten years ago for the San Francisco market, but are now out of favor. Cherry currants are grown with a profit; of gooseberries we have few.

Strawberries are cultivated extensively in Santa Clara County for the San Francisco market. The best fields of vines in their third and fourth years will yield from 4,000 to 6,000 pounds per acre, and the wholesale price in this city may be six or seven cents per pound, making a gross yield of $240 to $420 per acre. The cost of picking is 2 cents, of railroad freights ½ cent, drayage in San Francisco ¼ cent, and commissions 8 per cent. The amount received is sometimes from 60,000 to 70,000 pounds daily, indicating a lively consumption for a city of 180,000 inhabitants. The strawberries are mostly grown on the shares by Chinamen, who give half the crop for the land. As the vines produce nothing the first year, and the Chinamen are poor, the land-owner usually loans his credit for provisions, and clears $100 per acre. Six Chinamen do the work on ten acres of strawberries, except in the picking season, when three extra men are employed to the acre. Strawberry fields have fallen into the possession of the Chinese within the last five or six years, and the profits to the landlords are greater than under the old system of paying wages. It would be impossible to grow the berries profitably without Celestial help, and except in a few moist spots without irrigation.

§ 191. *Ornamental Gardens.*—Professional gardeners say that California is better fitted by nature than any part of Europe or the Atlantic slopes to have beautiful ornamental gardens. Our shrubs are more numerous, grow larger, remain green longer, and have a longer blooming season, than those of other States. The rose, the daisy, the pansy, the œlyssum, the clyanthus punceus, the flowering verbena, the hollyhock, and the calla, or Ethiopian lily, bloom here in the open air every month in the year. The honeysuckle, metrosideros, and myrtle, bloom from March to December; the geranium and snow-ball from April to October; the violet from October to May; the pittosporum from November to March; the spireas and flowering almond from March to June; and the camelia japonica from January to May, all in the open air. Persons at all familiar with the cultivation of these flowers in New York, will observe that the blooming season here is, on an average, fully double its length there. Not only do they bloom in the open air, but they retain their leaves through most of the winter months, so that our gardens are never bare and cheerless, as they are in the Atlantic winters. I have seen a rosebush bearing twenty full-blown roses in January, and that in the open air, with no assistance from artificial heat, and no protection save that of clambering up a brick wall on the southern side of an unoccupied house. Our roses are larger as well as more abundant than in the Eastern States, but their perfume is not so strong. The delicate European varieties, which die in the winter of Pennsylvania, abound in our gardens. Among the favorites are the Pauline, Malmaison, Madame Laffay, Model of Perfection, Raglan, Hopper, Giant of Battles, Prince Charles, Devoniensis, Lamarck, Clara Wendel, Glory of Jena, and Agrippina.

A marked feature of our ornamental gardening is our ability to cultivate in the open air many plants which can only be preserved in this latitude east of the Rocky Mountains under glass, and with the aid of artificial heat. These plants are too numerous to be all specially named here; but some of the more important are the geranium, fuchsia, orange, camelia japonica, laurastinus, myoporum, ericas, casuarina, daphne, eucalyptus, metrosideros, and thirty varieties of acacia, twenty of them from Australia. It might be almost said that we have no hot-houses in the State, but only green-houses, for it is scarcely ever necessary to make a fire, even to protect the most delicate of tropical plants. Our climate is very favorable to the growth of evergreens, especially to those strange and beautiful ones from Australia, with the graceful growth, and the brilliant, feathery foliage.

Among the creeping vines grown in California is the Australian bean, which has a dense, bright, evergreen foliage, and abundant flowers throughout the year. It climbs strings, and is therefore well suited to shade verandas, and to grow in the front of porticoes.

The rose, the honeysuckle, the veronica, the oleander, the laurastinus, the euonymus japonica, and the verbenas—especially the lemon verbena—may safely be said to make twice as much wood in a year as they do on the Atlantic Coast. The geraniums in San Francisco are almost trees. Rose-sprouts often grow twenty feet in a season, and other plants in proportion. There is scarcely any tree or shrub cultivated in the Atlantic States which does not thrive equally as well here, except the weeping willow.

California has thus far furnished very little for our gardens. There are many singular plants in our mountains, but few have found favor with our gardeners. The ceonothus is the chief ornamental shrub, indigenous in California, adopted for cultivation.

§ 192. *Arboriculture.*—The cultivation of forest and shade trees is yet very limited in California. For timber purposes the blue gum or eucalyptus globulus is preferred, on account of the rapidity of its growth, and the strength, hardness, and durability of its wood. Several other species of the eucalyptus are also in favor. The black locust grows rapidly, but is in some places injured by insects, and it gives trouble by the numerous sprouts that rise from its roots. In the interior towns the scycamore, cottonwood, native willow, Lombardy poplar, the ailanthus, and the Eastern and California maple, are used for shade; but in the gardens near the middle coast, where the summers are not very warm, and shade not much needed, the Monterey cypress, Monterey pine, and Lawson cypress are preferred, on account of their beauty, the density of their foliage, the regularity of their growth, and their hardiness.

§ 193. *Pests of the Farmer.*—Certain "pests" of the farmer must be mentioned here, among which are the spermophile, gopher, grasshopper, locust, grape-bug, orange-bug, army-worm, Canada thistle, mullen, dock, fern, and so forth. Of the spermophiles and their habits I have spoken in the chapter on the zoölogy of the State. The amount of mischief which they do is very great. The most effective means of driving them off are poisons, chiefly strychnine and phosphorus. About a drachm of strychnine is dissolved in a quart of whisky, and then the solution is poured over dry wheat, in such quantity that the surface of the liquid is just on a level with the top of the grain. In the course of twelve hours the wheat absorbs all the liquor, and a few grains may then be thrown in front of every squirrel hole. Another method of preparation is to cover a pint of wheat with boiling water, and keep hot till all the water has been soaked up; then pulverize an ounce of strychnine, mix it well with the hot wheat; add two ounces of brown sugar, and stir that up with the mass; then add four ounces of corn meal to serve for drying and covering the moist kernels. Wheat thus prepared will keep a long time after it is dried, and three or four grains dropped in a squirrel hole will have a perceptible effect. Pieces of watermelon and of sweet apple, sprinkled with powdered strychnine and placed near the squirrel holes, are good.

Phosphorus is dissolved by hot molasses or water. The molasses with phosphorus is mixed with wheat and flour, and small quantities of the mixture are dropped into the holes. By another method the wheat is soaked in boiling water until it is soft, when the water is drawn off, and a stick of phosphorus three inches long put into the hot water, melts in ten minutes, and the wheat is stirred about well, so that the melted phosphorus will touch every grain. The wheat is then poured upon some bran, in which it is rolled, so that every kernel may be covered; and the grain is ready for its purposes of destruction. A couple of kernels will kill a squirrel; and if a cat eats the squirrel, it will kill him; and if a raven picks out the eyes of the cat, he will die too. Such a progessive destruction has been observed more than once in California.

The squirrels may also be killed by soaking a rag in kerosene, sprinkling it with sulphur, setting it on fire, throwing it into a squirrel hole, and filling the mouth of the hole carefully with dirt, and of every other hole where the smoke appears in the vicinity. Sometimes several burrows are connected. In one case eighty squirrels were thus killed with one rag. A bellows with a chamber for burning sulphur has been devised for blowing poisonous fumes into the holes. But in defiance of these ingenious methods to destroy them, the pests are still numerous.

The gopher may be poisoned with phosphorus or strychnine, and may be caught more readily with traps than the spermophile. In the chapter on zoölogy I have described the trench used for keeping gophers out of orchards and gardens, and for catching them.

The grasshoppers are the greatest pests of the farmer in California, and several times during the last fifteen years they have eaten every green thing within large districts. They come in millions upon millons, and darken the air, moving forward at the rate of a mile or two a day, and leaving no grass or leaf behind them. Grains, grass, weeds, kitchen vegetables, and fruit trees, are alike eaten bare of every green particle. Grasshoppers are abundant in countries where the summers are dry, the winters warm, and the vegetation vigorous; and if a large extent of land be uncultivated, they will occasionally be so numerous as to destroy every green thing. They are bred in the hills of California, and after dry winters descend into the valleys, usually content to eat the wild grasses, but sometimes attack the cultivated fields. There is no known method of killing them after they have entered a field, or of driving them away from it; but they may be kept out by digging a trench, putting straw in it, with some moist straw on top, and then setting fire to it. The grasshoppers do not like the fire and smoke, and will try to avoid them.

Under the head of the grape and the orange, I have spoken of the bugs which infest them. The army-worm and weevil have been seen in California, but have done little damage as yet. The curculio is not known in the State. The Canada thistle, the mullen, and the dock, have been introduced, but have not yet given much trouble.

§ 194. *Irrigation.*—According to the State Surveyor-General's statistics for 1871, California had in that year 915 irrigating ditches, supplying water to 90,344 acres—an average of about 100 acres to the ditch. Siskiyou is credited with 180 ditches, and 6,900 irrigated acres; Tulare, with 110 ditches and 5,000 acres; Mariposa, with 60 ditches and 210 acres; Los Angeles, with 52 ditches and 18,200 acres; Tuolumne, with 2 ditches and 15,000 acres; San Joaquin, with 2 ditches and 3,000 acres; Alpine, with 2 ditches and 2,500 acres; and Calaveras with 27 ditches and 272 acres.

Most of the irrigation works which existed before 1872 were of little relative importance; they supplied less than one acre in a thousand, and most of them were very costly, comparatively, on account of their small size. California is now about to enter on the era of irrigation. The first of the new ditches —that of the San Joaquin and King's River Canal and Irrigation Company—supplies 15,000 acres with irrigation this year. It is thirty-eight and a half miles long, fifty-five feet wide, four feet deep, has a descent of one foot to the mile, and runs northwestward from the bend of the San Joaquin River. About half of the land irrigated is in grain, and half in alfalfa. The experience so far is most encouraging, the irrigated land all producing large crops, even where the soil is poor; while the richest soil, above the level of the ditch, yields nothing. In addition to the 15,000 acres, 60,000 more can be irrigated from this ditch, so far as completed. It is proposed to extend the ditch forty miles, to San Joaquin City, on the San Joaquin River, with a grade of half a foot to the mile. The extension will supply water to 250,000 acres, making the total area for the entire ditch, 325,000 acres. At twenty bushels to the acre, that ditch alone will secure a production of 6,000,000 bushels of wheat from a district that was long considered worthless for tillage, and that has never yet produced 60,000 bushels, though thousands of acres have more than once been sown there.

The King's River Irrigation Company take out water from King's River, where it enters the San Joaquin plain on the north side. The ditch is thirty feet wide and three feet deep, with a grade of a foot to a mile. The supply of water is sufficient for 300,000 acres, and there would be no serious difficulty in enlarging the canal to take out all the water.

The Fresno Canal was constructed by Friedlander, Chapman, and Howard, to take the water from Fresno River, where it strikes the plain. The main canal is ten miles long and forty feet wide, with a grade of eight-tenths of a foot to a mile, with capacity to irrigate 40,000 acres; and it is to be supplied with a reservoir a mile and a half long, a hundred feet wide, and ten feet deep. The district to be irrigated is known as the Alabama Settlement, south of the Fresno River.

Chapman, Miller & Lux have made a canal, tapping the San Joaquin twelve miles above the bend, and running northward, nearly parallel with the stream below the bend. It is thirty miles long, thirty-five feet wide, and three feet deep, with a grade of a foot to a mile, and capacity to irrigate 50,000 acres. The land covered by this ditch belongs to the three ditch-builders.

There are several considerable irrigating ditches in the eastern part of San Joaquin County, and in Kern and Yolo Counties.

Assertions have been published repeatedly that the construction of large canals would tend to throw the land irrigated into the same ownership with that of the water supply, and thus would not only prevent the sale of the large tracts now held by single individuals to small farmers, but would compel the sale of many tracts to the ditch-owners. G. P. Marsh claims to have observed such results in Lombardy, but he may have misunderstood the causes. All the experience of our continent tends to prove that the number of independent land-owners increases with the substitution of tillage for pasturage, and again with the substitution of horticulture for grain-farming on dry soil in a dry climate. The cultivation of irrigated land is horticultural in its tendencies. Twenty acres of irrigated land may demand as much labor, and pay as much gross revenue, as two thousand do without artificial water supply, if kept merely for wild pasturage. The size of the farms depends on the quantity that a farmer can afford to buy, and can profitably use, with his supply of capital; and as irrigated land is much dearer, and requires a larger expenditure for cultivation by the acre, it is evident that the average farmer can neither buy nor manage one-tenth so much as he could of dry valley land. These principles must be quite clear to men of intelligence; and they are verified by the results. We find, for instance, that in Utah, where the tillage is done almost entirely by irrigation, the average size of the farms is only thirty acres; and in Wyoming, where irrigation is also necessary, the average is twenty-five acres; while Rhode Island and Massachusetts, the next lowest, have more than ninety acres, and California, under the influence of its large dry ranchos, four hundred and eighty acres. If we compare the counties of California, we find that one-half of the farms in Los Angeles are between three and fifty acres in size, or more than twice as many, relatively, in 1870, as in Monterey and the San Joaquin Valley, where there were then few irrigating ditches. It is notorious that there are more landowners and more thorough cultivation in proportion to the area at the cities of Los Angeles, Anaheim, and San José, the chief irrigation centers of the State, than in any dry-soil districts. This should be a complete answer to those who argue that irrigation will help to concentrate the ownership of the land in the hands of a few, and reduce the farm laborers to greater dependence.

§ 195. *Reclamation.*—The reclamation of the tule and swamp land is a matter of vast importance to the future of California. The tule land occupies three million acres along the banks of San Francisco, San Pablo, Suisun, and Humboldt Bays, and the San Joaquin and Sacramento Rivers, the greater portion of it being in the heart of the State. The soil is rich, and needs only to be protected against floods and high tides, to equal in production the best land in the State. This protection is afforded by dykes, twenty or thirty feet wide at the base, and five feet at the top, with a height varying from five to ten feet. This embankment costs ten or eleven cents per cubic yard, and the ordinary cost of reclamation ranges from $5 to $20 per acre, according to the varying circumstances. The legislature of 1872 passed an act authorizing the sale of bonds to pay for the reclamation of the several tule districts, the bonds to be a mortgage on the district reclaimed. It was supposed that bonds to the amount of $20,000,000 would be sold under this act; but there is no sale for them, except at a discount of fifteen or twenty per cent., and the land-owners do not wish their land reclaimed at such loss. It is supposed that a better price can be obtained after the passage of an act to remedy some of the defects of the statute of 1872. About 100,000 acres have been partially reclaimed already.

§ 196. *Products of our Herds.*—We can estimate the butter of the State to be worth 35 cents per pound, or $2,450,000; and the cheese 20 cents, or $680,000. The amount of milk sold annually is 3,700,000 gallons, which brings about $1,000,000 to the dairy-men. In 1872 the exports of hides were worth $170,000; of horns, $11,000; of bones, $6,000; and of wool, $7,750,000. The value of the animals slaughtered annually is $6,100,000. These figures give us $18,137,000 as the annual value of the products of our herds, exclusive of the hides tanned into leather, and of the services of draught and riding animals.

§ 197. *Sheep.*—The climate of California is peculiarly favorable to the growth, increase, and health of the sheep. Our mild winters permit them to grow throughout the year; and it is an accepted principle among those familiar with the subject, that a sheep, born and bred in California, is, at two years of age, usually as large and heavy as one of three years, born and bred in the Atlantic States. The ewes produce twins and triplets more frequently here than east of the Rocky Mountains. The health of the herds is better. No fatal disease has ever prevailed to any serious extent. The "scab" exists in many herds, but in a mild form, and few have died of it. It is the general opinion of sheep-breeders that the sheep bred in California will produce more wool than those of other States. The heaviest unwashed fleece on record, is that of "Grizzly," a French Merino buck. It was fourteen months old, weighed forty-two pounds, and was sheared by Flint, Bixby & Co., in Monterey County, in 1859.

Sheep in California are never kept under shelter, and except a few of fine blood, seldom get any food, save such as they can pick up on the open hills and plains. Sometimes lambs are lost with cold, but this is very rare when they are well managed. At night the herds are driven into corrals or pens, to protect them against the coyotes, and to keep them from being lost. On the large sheep ranches, one herdsman is employed for a thousand sheep. There are a few shepherd-dogs in the State, some brought from Australia, others from Scotland. The word "corral" is understood by these dogs, and when they hear it, they immediately drive the herd to the corral. At the sight of a wolf they hastily collect the sheep into a dense body, with their tails out and the lambs in the center. If a sheep turns his head out, the dog bites his knees and makes him turn about. The dog seems to understand that the wolf cannot do much harm by biting the rump of a sheep, but would soon kill it after catching its throat.

In most other sheep countries, the sheep-breeder is at great disadvantages as compared with California: the land is dear; it must be cultivated; the sheep must be fed by hand every day during a considerable part of the year; the herds must be under shelter in the winter; four or five men are required, on an average, to attend to a thousand sheep; the herds are not so healthy, do not increase so rapidly, do not grow so large within the first two years, and do not produce so much wool. The land of the sheep ranches in California is not worth more than five dollars per acre, on an average—probably not more than three dollars. It follows that sheep-breeding should be very profitable here, and so it is. The ewes, when properly taken care of, have lambs before they are a year old—increase one hundred per cent. every year. The cost of keeping large herds is variously estimated at from thirty-seven to fifty cents per head annually, exclusive of the interest of the land used for pasturage. The wool of a good sheep will pay twice the cost of keeping it; and the wool and lamb together, of a fine-blood ewe, are worth eight or ten times the cost. It is the present custom to sell the wethers for mutton when a year old, but this is bad policy, save with the poorest sheep.

The old missions had large herds of sheep, but after the management of those large establishments was taken from the priests and given to civil officers, in 1833, the sheep were neglected and most of them were killed. Twenty years later very few were left in the State; but there was a demand for mutton, so large herds were driven from New Mexico. These were a very poor stock, but they were for a long time the only sheep that could be had. The first attempt to breed sheep, as an exclusive business in California, since the American conquest, was commenced in 1853, by a poor man who had nothing save nine hundred ewes; and they increased so rapidly, and proved so profitable, that within ten years he had ten thousand sheep, sixteen thousand acres of land, and other property to the value of one hundred thousand dollars, and his wealth has greatly increased since.

The business of wool-growing has advanced with more steadiness, and has paid greater average and regular profits, than any other agricultural occupation extensively pursued in the State. The increase in the production was for a long time fifty-five per cent. annually. In 1855 the yield was 300,000 pounds, in 1860 3,260,000, in 1865 6,445,000, in 1870 19,700,000, and in 1872 23,000,000. Every man who has managed a large sheep ranch with knowledge and prudence has become rich.

The varieties most prized are the French and Spanish Merinos, but in addition to these we have some fine Southdowns, Cotswolds, and Leicesters. According to the State statistical report of 1873, California had in that year 4,000,000 sheep, and as the yield was 30,000,000 pounds, the average per sheep was seven pounds to the head. The Federal Census report says the average yield per head was four and an eighth pounds. California has the finest large herds of sheep in the United States, and produces the most wool. The number of sheep in the State now is probably 4,500,000.

The increase of a well-managed herd of sheep in California is seldom less than 80 per cent., or more than 110 per cent. of the number of ewes over two years old; and the increase is about the same in all the varieties, the average being about 95 per cent. Of the two-year-old ewes, 10 per cent. have twins; of the three-year-olds, 30 per cent.; of the four-year-olds, 35 per cent.; and the percentage remains the same till they get to be ten years old. From five to ten per cent. are barren each year, but absolute barrenness is very rare. Two or three per cent. of the lambs are separated from their dams during the first two or three days, and die of neglect; and two per cent. die of injuries received while being marked.

South of Santa Clara the grasses are more nutritious and more abundant in favorable years than in the north, and the climate is more genial. In good seasons an acre should sustain a sheep. In the winter, spring, and summer, the herds pasture chiefly on the alfilerilla and bunch grass, preferring the former to everything else; but in the fall nothing is left for them save burr-clover, and they take to that. The burrs are so rough that they sometimes cut through the gullet, or stomach, and thus cause the death of the sheep. They also get into the wool and seriously injure its value, because they are set round with little spines, and can only be removed by a gin. They are as brown as the earth, cover the southern valleys, and possesssing a rich nutriment, they enable sheep to fatten on land that to the inexperienced eye looks as barren as bare sand. These burrs are especially abundant in the wool from the southern coast; that from the northern part of the State is much cleaner in every respect. The best northern wool brought to our market in any considerable quantity is worth 23 cents per pound; the same quality from San Luis Obispo, full of burrs, is sold for 16 cents. A little washed wool is brought from Russian River Valley, but our woolen factories have to wash and clean all their wool. Most of the best wool of the State is purchased here, and the poorer qualities are exported. The condition of the wool is taken into account, as well as the blood of the sheep.

§ 198. *Neat Cattle.*—The neat cattle have been decreasing since 1860, in which year the number was 1,100,000, whereas now it is 820,000, a decrease of nearly 300,000. Beef has been unprofitable, and the sheep and wheat together have occupied large areas once occupied by cows. In 1853 the miners stigmatized the coast as "the cow counties," but the name is no longer applicable. The counties which have the most neat cattle at present are: Fresno 119,000, San Luis Obispo 61,000, Tulare 58,000, Kern 59,000, Sonoma 45,000, Monterey 37,000, Merced 34,000, Humboldt and Los Angeles each 27,000, Contra Costa 25,000, and Colusa, San Joaquin, Sacramento, and San Diego, each 20,000. The true cow region now is the southern part of the San Joaquin Valley, where Fresno, Merced, Tulare, and Kern have together 270,000 head, or one-third of the entire stock of the State.

§ 199. *Spanish Cattle.*—Many of our neat cattle are of the old Californian breed, brought hither by the Spanish missionaries from Mexico, about 1770. At what time their stock came originally to Mexico is not precisely known, but without doubt it was in the seventeenth century, soon after the conquest by Cortez, and they must have been imported from Spain. They are called "Spanish cattle." In Mexico, as subsequently in California, they were allowed to run almost wild, and they took something of the appearance of wild animals. They have nearly the same range of colors as the neat cattle of Europe; but mouse, dun, and brindle colors—almost infallible signs of "scrub" blood—are more frequent; and the deep red, fine cream color, and delicate mottling of deep red and white, found only in animals of high blood, are entirely wanting. Their legs are long and thin, their noses sharp, their forms graceful, their heads high, their horns long, slender, and widespread; and they have a duskiness about the eyes and nostrils similar to that of the deer, between which animal and a young Spanish cow there are many points of resemblance. The general carriage of a Spanish cow is like that of a wild animal: she is quick, uneasy, restless, frequently on the lookout for danger, snuffing the air, moving with a high and elastic trot, and excited at the sight of a man, particularly if afoot, when she will often attack him. In some districts it is, for this reason, unsafe to go about on foot. The herdsmen are always mounted, and to these the cattle are accustomed; but a man afoot is considered to be a dangerous animal, deserving of the same treatment as wolves and coyotes. The Spanish cow is small, does not fatten readily, produces little milk, and her meat is not so tender and juicy as that of American cattle.

The breeding of neat cattle was almost the only business of the country previous to the American conquest, and they were killed for their hides and tallow, which were the chief exports. The meat went to enrich the land; there was too much of it to be eaten. The breeding of cattle being the chief occupation of the Californians, determined their mode of life, the structure of their society, and the size of their ranchos. Nobody wanted to own less than a square league, (four thousand four hundred and thirty-eight acres) of land; and the Government granted it away without charge, in tracts varying from one to eleven leagues, to anybody who would undertake to erect a house and put a hundred head of cattle on the place. It was common for one man to own five thousand head of cattle. The cows were kept for breeding, and the steers were regularly killed as they reached the age of three or four years. All had the freedom of the country and ranged where they pleased, except that several times a year every man collected his own upon his ranch. There was about one bull to fifty cows. No attempt was made to improve the breed, nor was any profit to be made from an improvement. Most of the calves were born about the beginning of the year, and in March the first rodeo was held.

§ 200. *Rodeos.*—The word *rodeo* comes from the same root with "rotate," and means a surrounding, a gathering of all the cattle on a ranch, and the separation and removal of those belonging to other ranches. There are general and special rodeos. A rodeo may be for one ranch or for several; but every ranchero owning a large ranch and many cattle, has his own rodeos: at least one rodeo in the spring and another in the fall. The general rodeo is held for the benefit of all the cattle-owners in the neighborhood; the special rodeo is held for the benefit of some particular person or persons who desire an opportunity to remove their cattle from a ranch. Every owner of a rancho is required by law to give a general rodeo every spring.

When a general rodeo is to be held, the ranchero sends notice several days or weeks in advance to the cattle-owners in the vicinity; and in the cattle-districts the neighborhood extends forty or fifty miles, for cattle will stray that distance. On the day appointed, the ranchero having selected some place where the cattle are to be collected, sends out his mounted *vaqueros*, or herdsmen, at daylight drive the cattle to the appointed place, where they are gathered at ten o'clock. By that time, the interested rancheros with their vaqueros have made their appearance, and are on the ground, all mounted and prepared for the day's work.

The ranchero who gives the rodeo is present to entertain his visitors, and his men are instructed to keep the cattle together. The herd may be very large. I have seen eight thousand head of cattle in a rodeo, forming a solid body about a quarter of a mile in diameter in every direction. The visiting rancheros who have come from the greatest distance are permitted to enter the mass first, select their cattle, and drive them out. Each man has a position chosen at a distance of half a mile or a mile, whither he drives his cattle; and there are several men there mounted, to prevent them from returning to the main herd. When a ranchero sees one of his cows in the herd, he calls to a friend, and the two chase her out. She does not wish to go, and tries to hide herself among the other cattle. The horses, accustomed to the rodeo, soon recognize the cow that is to be parted out, and enjoy the work. They turn with every turn of hers, and she is soon tired and compelled to go out. If the cow be accompanied by a large unmarked calf, the latter is often caught with the lasso, thrown down, and then marked with the knife. While these rancheros are riding about among the herd, and seeking their own, the cattle are driven by a few vaqueros belonging to the ranch, so as to move about in a circular manner. As the cattle are thus moving round in one direction, the rancheros of the immediate neighborhood, whose time has not yet come for entering the center of the rodeo, ride round in a direction contrary to the course of the herd, and thus are enabled to see them to more advantage than if they were standing still. After the rancheros from a distance have parted out all their cattle, those of the vicinity ride in, and the whole day is thus spent in racing and chasing after cattle.

The man who gives the rodeo does not attempt to examine the cattle which are driven away. He takes it for granted that every one will drive off only his own animals. Sometimes several days are necessary to complete the general rodeo of a ranch, and the work is continued from day to day until finished. All the rodeos of a neighborhood are usually held in a regular and close connection. The rancheros from a distance, therefore, stay until they have attended all the rodeos in a district to which they suppose that any of their cattle have strayed; and they are usually the guests of the man upon whose ranch the rodeo is given.

When a cow is driven out, her calf follows. Every ranchero knows his cattle by the brand, which law and custom require him to use. Of course, when a man has four or five thousand head of cattle, he cannot recognize them all by sight: he can only distinguish them by marks. He knows his cows by their brands, and his calves by their following the cows.

The spring rodeos are the busiest seasons of the rancheros, and are for them the chief occasions of general meeting, exciting adventure, conversation, and festivity, in the course of the year. Frequently three or four hundred men will meet at these places, mounted on their best horses, and ready for fun. All the work of the rodeo is exciting. Lively scenes are enacting at every moment, and in every direction. Calves will try to get away from the herd, and escape to the hills. Cows which have been driven out will endeavor to get back. These must be chased by the horsemen. Frequently the lasso must be used. Many of the vaqueros are fond of showing their skill before so many spectators, and astonishing feats of horsemanship are performed.

When a ranchero returns from a rodeo, with his cattle which had strayed away, he drives them into his corral, and brands and marks his calves; so that if they should return to their former range, he will know them the next year. If those that have been on other ranches are too numerous to be branded and marked in one day, some of his vaqueros stay with them on horseback, and herd them until all can be marked. When a cow has become accustomed to a ranch, she likes to return to it. After all the calves are marked, the owner does not care much whither they go, provided that they do not stray beyond the limits of the ranches, the rodeos of which he attends. It is only in times of extraordinary scarcity of grass that the rancheros are particular to drive the cattle of other owners off their lands.

The rodeo season being over—that is, when the ranchero has all his cattle on his own ranch, and his alone—he commences the work of branding. His vaqueros drive about two hundred cows with their calves into the corral every morning, and two or three good vaqueros will brand these calves in a day. The vaqueros enter the corral with their horses, which they need when the calves are large and strong, for many of them are three and four months old. If the calf be small, the vaquero may be afoot to lasso him. One vaquero throws a reata over the calf's head, and another catches him by the leg; they throw him down, and one holds him, while the other gets a hot branding-iron and burns the owner's mark upon its hip. Thus the work goes on from day to day, and from week to week, until every calf on the ranch is marked.

§ 201. *Brands.*—The law requires that every horse and cow shall be branded with a brand belonging to their owner. The brand is made of iron, sometimes representing one or two letters, sometimes other arbitrary signs, such as a cross, a circle, a triangle, or any other design. The brand may be six inches long by four wide, and the thickness of the iron is about a third of an inch. There is an iron handle, with a wooden crosspiece at the end, so that the brand can be handled when hot, and held down firmly upon the prostrate calf, until the figure is indelibly burned into the skin. A copy of every brand must be burned upon leather, and deposited in the county recorder's office. Every minor and servant on a ranch must use the brand of the owner of the ranch. The brand must be burned, under penalty, upon all horses and neat cattle, before the age of eighteen months. The brand is burned upon the hip, and indicates ownership; when the animal is sold, the brand is burned upon the shoulder and indicates sale. The purchaser then puts his brand upon the hip; and thus the skin of a Californian horse or cow contains the history of its ownership. Many of the brands are well known to the rancheros over a large portion of the State; and by looking at the animal, they will tell where it was born, and who have owned it at different times. The hips and shoulders on both sides are often covered with brands. Sometimes the brands grow with the animals; in other cases they remain nearly of their original size. A brand well burned into the skin is perceptible as long as the animal lives, though it grows less and less distinct with the advance of years.

In the fall there is another season of rodeos, to brand such calves as may have escaped notice at the spring rodeos, or may have been too small to be branded.

The rancheros sometimes have a mark in addition to their brand, such as slitting the ear or cutting a notch in the dewlap. A drawing of the mark must be deposited in the county recorder's office. It is contrary to law to cut off the end of the ear, or to cut it on both sides so as to bring it to a point; for those modes of marking would give opportunities to cut away the marks of other people. The bull-calves are usually altered at the rodeos, as well as branded and marked. The cattle on many ranches are touched only twice in their lives by the hand of man—first, when they are branded; and next, when they are slaughtered.

§ 202. *Early Maturity.*—The cows calve almost invariably before they are two years old, frequently before they are eighteen months, and sometimes before fourteen months. They generally arrive at maternity a year sooner than in the Atlantic States. The Spanish rancheros have eight or ten bulls to a hundred cows; the Americans usually four or five. The calves suckle from six to ten months: that is, from January or February, when they are born, until November, when the pasturage is very scanty. The Spanish cows have small udders, and yield little milk; and notwithstanding their great number in the country, butter, milk, and cheese were very rarely seen on the table previous to the coming of the Americans. American cows are the only ones used for the dairy, but many of them are now kept also for breeding alone, and, like the Spanish cows, are never milked.

§. 203. *Corral and Reata.*—The *corral* is an important part of all cattle-ranchos, and on many of them it is the only enclosure. It is a pen, from thirty to fifty yards square, surrounded by a high, strong fence. It is used whenever horses or cattle are to be branded.

The *reata*, used for lassoing, is a rawhide rope, about five-eighths of an inch in diameter, and thirty yards long. It is made of four strips of cowhide, from which the hair has been scraped; and after plaiting, it is greased and dragged along on the ground after a saddle to render it pliable. Rawhide is better than any other material, because it has just the proper weight and stiffness for the purpose. A running noose, which slips very easily, is arranged at one end. When the reata is to be used, the noose is made from four to six feet long; one side of the noose and the reata just outside are taken in the right hand, so that while in the hand the noose will not slip; the remainder of the reata is held coiled up in the left hand, ready to be let go. The vaquero swings the noose around his head in such a way as to keep it open; and when he has a good swing he lets go, and away it will fly its whole length. If it catches the object aimed at, the noose draws tight. It is not an uncommon thing for a vaquero to catch a cow at a distance of thirty feet, while she and his horse are both running rapidly; but usually he will get within fifteen or twenty feet if he can, before throwing his reata. A good vaquero, standing in front of another man, can push the latter back, and the moment his foot leaves the ground throw a reata under it, and thus lasso him by the leg. When cattle or horses are to be branded, they must be thrown down; and this is generally accomplished by catching the head with one reata and a hind leg with another.

§ 204. *Occasional Starvation.*—Nineteen out of twenty of the cattle of California never get any food save such as grows indigenously in the open country, and they always suffer for it. From March to July the pasture is abundant and excellent, and the cattle are fat; from July to October, in ordinary years, the grasses and clovers, though dry and brown, are nutritious, and the cattle still remain in good condition; but from October to January they grow lean rapidly, and almost every year a considerable number of them die by starvation. Either the grass may be all consumed, or it may be deprived of its nutriment. The first case happens when the grass is very scanty, because of the small fall of rain during the winter; the second occurs when a heavy rain, lasting a day or two, comes before New Year's day, and is followed by cold, dry weather. The rain takes away the palatable and nutritious qualities of the old grass, and the cold and dry weather prevents the starting of the new grass, and between the two the cattle suffer. In 1856, seventy thousand head of cattle died in Los Angeles County alone by starvation, one-third of the entire number in the county, which has now only 27,000 in all. In 1863 and 1864, the loss by starvation was estimated at 200,000 or 300,000. Santa Barbara County had 97,000 head in the spring of 1863, and only 12,090 in the spring of 1865, indicating a decrease of 85,000. The numerous droughts affect the neat cattle interest more permanently than any other. The failure of wheat in one year does not injure the crop of the next, but is rather a benefit to it, since the soil has had a rest, and its materials have been prepared for plant assimilation by exposure to the air. A severe drought prevents an increase in the sheep, but does not reduce their number. But the neat cattle receive less care, are less profitable, and find more difficulty in surviving on scanty pasturage.

§ 205. *Fine Blood.*—The cattle of pure Spanish or Mexican blood in a few years will have entirely disappeared from the State. The American and English breeds are replacing it.

The American cows are fine animals for milk and beef, but they are not uniform in blood, and are inferior in the most desirable qualities to the carefully bred Durhams, Ayrshires, and Alderneys, which are regarded here with more favor than any other of the European stocks. The wild pastures of the State are not fitted to keep up the character of the fine breeds, and after a few years the offspring of the Durham and Devon bulls, left without cultivated food, are scarcely distinguishable from the common herd of mixed American and Spanish blood. The time is, however, not far distant when we shall have extensive pastures in the reclaimed and irrigated districts, and then our neat cattle will soon show a great improvement.

§ 206. *Pasture.*—The cultivated food given to dairy cows in California consists of maize cut green, pumpkins, beets, potatoes, bran mixed with chopped straw and hay, alfalfa, oats, and barley. The natural pastures near the ocean keep green longer than those in the interior, and they are therefore better adapted to dairy purposes. Fine pasture is found in some of the high parts of the Sierra Nevada, and many dairymen who have their homes in the valleys or foot-hills, drive their herds up into the mountains at the beginning of summer, take their families with them, and spend their time in making butter until the approach of winter drives them down, when they bring the product of their season's work down to the market.

§ 207. *Butter.*—The production of butter in California amounted in 1872 to 7,500,000 pounds, a large quantity as compared with that of other countries with a similar climate. The dairy cows are nearly all of American blood, crossed with Durham, Ayrshire, or Devon, and a few are of the pure British milking breeds. In many places they get no cultivated food except in times of drought, when they receive enough hay to keep them alive; but there is a constant improvement in the style of their keeping and also in the profit of the dairies.

The chief dairy districts are Marin, Sonoma, Santa Clara, Monterey, San Luis Obispo, and Santa Cruz, (the counties west of the Diablo divide, between 35° and 39°, taking the lead) then Sacramento, San Joaquin, and Yolo, (the center of the Sacramento-San Joaquin Basin) and after these the Sierra Nevada.

The most notable dairy property in the State was a few years since a small tract of 130,000 acres, in Marin County, owned by three gentlemen; but it has since been divided into three equal parts, one belonging to J. M. Shafter, another to C. Howard, and a third to the estate of O. L. Shafter. It fronts thirty-five miles on the ocean, including Point Reyes, north of the Golden Gate, and extends inland ten miles. This estate was stocked with cows, which were leased in herds, with from five to seven acres to each cow, the lessee paying about $25 cash for each cow, and a cow-calf for each two cows as annual rent. The yield for each cow above expenses is estimated at $60, so that the lessee has a fair chance to prosper with good management; and the dairy-men of Marin, as well as of other parts of the State, have generally done well. No other agricultural occupation in California has paid so steadily, or given competence to so large a proportion of the men engaged in it, except wool-growing.

§ 208. *Cheese.*—The annual production of cheese in California is 3,400,000 pounds, including 700,000 from Monterey, 525,000 from Santa Clara, 470,000 from San Mateo, 380,000 from Marin, 340,000 from San Luis Obispo, 250,000 from Sonoma, and 230,000 from Merced. Monterey and San Luis Obispo, which front on the ocean for a hundred miles south of 36° 40′, and produce about one-twelfth of the butter of the State, supply more than one-third of the cheese; while Marin and Sonoma, which occupy the Pacific shore from 38° 40′ to 39° 50′, make three-sevenths of our butter, and only one-fifth of our cheese. The cheese dairy-men feed less cultivated food to their cows than do the butter men, and generally they occupy places less accessible to the market. Partly on account of the lack of cultivated food, and the large areas necessary to support one cow—usually from five to ten acres, (whereas with cultivation, two acres would be sufficient) we have only two cheese factories to work up the milk of a number of different farmers, though many of the cheese houses designed to do the work of separate dairies are equal in size to large factories in New York.

§ 209. *Horses.*—California has 237,000 horses, of which perhaps a fourth are of pure Spanish blood, while the remainder are mostly mixed American and Spanish blood. The Spanish horses are of the old imported stock, sent early in the sixteenth century from Spain to Mexico, and thence brought to California about eighty years ago. Like the neat cattle, the Spanish horses run wild, and partake to some extent of the wild nature. They show their base blood by their colors—mouse color, dull duns of various shades, and calico color, or mixtures of white with red or black, in numerous large spots or blotches, are common ; while chestnut, bright sorrel, blood bay, and dappled gray, are very rare among them. They are quick, tough, healthy, and unsurpassable for the uses of the rider, and the *vaquero ;* but small, lacking in weight, strength, and beauty, and unfitted for the heavy, steady work of the plough, cart, or wagon. They are wanting in the docility, kindly disposition, and steadiness of the well-bred horse ; and they have little of that kind of sense which leads an American horse to be quiet and gentle, even in circumstances strange to him. For California as it was in 1845, there were no better horses than the Spanish-Mexican. They have a wonderful toughness, and some of their exploits in the way of traveling are unsurpassed in the annals of the turf. A number of instances are on record where Californian horses have carried a rider one hundred miles in a day, and that with no food save grass. Sixty miles a day is not an uncommon ride, nor is it considered a severe one. Fremont, on one occasion, rode four hundred miles in four days, riding different horses, but driving them before him from the beginning to the end of the journey.

Many of the brood-mares in the southern part of the State are wild Spanish; that is, they live entirely in the open plain, are unbroken, and many of them have never been touched, save when they were to be branded. They are in bands called *manadas*, numbering from thirty to sixty mares, which are under the guidance of one stallion or garañon. He knows every one of his band, keeps them together, conducts them to what he considers the best pastures, and drives away geldings, stallions, mules, and whatever animals he may dislike. When a vaquero tries to drive the manada into a corral for the purpose of catching some of the band, the garañon will frequently divide them and scatter them about, and render it impossible for the vaquero to get them together; for while he drives in one place, the stallion is equally busy at another, and the mares fear his teeth and heels as much as the swinging reata of the horseman. The garañon is usually from five to nine years of age. He guards his manada with the most jealous care. It sometimes happens that one garañon tries to take away a mare from the band of another, and then a fight ensues, in which the weaker has to suffer a severe biting and kicking, and then lose the object of the battle, too. The mananda keeps together for year after year, but when it gets too large, the vaquero will divide it and give a portion to the charge of another garañon. All the mares foal before they are three years old, whereas in the Atlantic States they seldom foal until a year later. They also breed more regularly than elsewhere, for when mares are kept in stables, they frequently pass seasons without having colts. The foals are branded at the age of three or four months, and are weaned at the age of eight or ten months. The fillies continue to run with the manada, and become part of it. The colts continue to run with the manada until they are three or four years of age, when they are broken and put into the *caballada*, or herd of broken horses. The Mexicans never broke their mares, and considered it discreditable and a mark of great poverty to ride one.

The American horses, that is the common stock of horses brought from the Atlantic States, and their offspring, are large, fine animals, not so healthy and tough as the Californian horses, but larger, more active, stronger, and more handsome in shape and color.

Many stallions and mares of fine blood have been imported, including thoroughbreds or English racers, Morgans, and various other American trotters, and Clydesdale and other heavy cart and truck horses. Some of these horses are valued as high as twenty thousand dollars each. The trotters are in greater demand, and bring higher prices than the thoroughbreds, and much more than the working horses; but the last are the animals of direct industrial value. The Clydesdale, crossed with the American and Spanish stocks, supplies many of our best horses for heavy draught. The pure Clydesdale weighs about 2,000 pounds; the three-quarter blood, (one quarter Spanish) at four years old, weighs about 1,500 pounds, and is worth $300; the half-blood weighs 1,300 pounds, and is worth $250; and the pure Spanish weighs 800 and sells for $50. The cross of the Clydesdale with the American, gives a larger and more valuable animal. Many of the Clydesdale grades (as animals of mixed blood are called) are worth from $400 to $800.

§ 210. *Mules.*—Nearly all the farm work of California, where draught animals are necessary, is done with horses. Mules are too dear and oxen are too slow. Many mules and horses are used in packing merchandise in those districts where there are no good wagon-roads. For the ordinary uses of the farm the mule is preferable to the horse, being longer-lived, more healthy, not so much injured physically or morally by ill-treatment, and able to thrive on cheaper and simpler food. But the mule is not considered handsome, and the small farmer wants a horse which he can ride, and with which he can take his family out. The State has 27,000 mules, and perhaps a dozen jacks of fine blood.

§ 211. *Swine.*—Swine are not in favor with the farmers of California, as may be inferred from the fact that the State had 600,000 of them in 1860, and has only 400,000 now. They increase rapidly, and their meat commands a high price, but they do not thrive upon the dry pastures; they are not permitted to run at large in many counties; the mast is scanty in the agricultural counties, and grain suitable for feed is dear. It is probable that after extensive districts are brought under the influence of irrigation, so that maize and succulent roots can be cultivated with more profit than at present, swine will come into more favor.

§ 212. *Angora Goats.*—The importation of Angora or Cashmere goats was commenced in 1858, and several hundred animals, represented to be of pure blood, have been brought to the State since; but, notwithstanding the most brilliant promises, they have as yet paid a profit to nobody save those who sold the bucks. A gentleman engaged in that business, and claiming to understand the value and market of Angora wool, published an article several years ago, stating that a herd of 768 nanny goats of common blood, supplied with Angora bucks, would in five years have increased to 8,364, most of them as good for wool as the pure Angora. The sales of wethers for mutton in the five years, at $4 per head, would amount to $5,000; and the sales of wool, beginning after two years, when there would be a considerable stock of goats of seven-eighths blood, would be $384 the first year, $1,728 the second, $4,896 the third, and from that time on would continue to increase at the rate of about fifty per cent. annually, if the wool were to bring $1 per pound.

After fifteen years of trial, California has discovered that there was something wrong about these promises. Instead of having a million Angora goats of nearly pure blood, and of exporting several million pounds of the wool, we have not exported so much as the imported animals should have produced: we have only about three hundred animals that deserve to be called Angora goats. There are 18,000 grade goats crossed with the common stock; but so far as experience has as yet determined, they are worthless for wool. Whether the Angora goats can be bred with a profit in California, is still a problem. They will live and multiply in some places where sheep will not. Thus, in the Sierra Nevada there is a strip twenty miles wide between 500 and 5,000 feet above the sea, where, on account of the abundance of brush, sheep will not thrive. The Cashmere goats prefer browsing to grazing, and they eat the foliage of all the bushes except the poison oak, standing upon their hind feet to reach as far as possible on the chaparral and manzanita. The goats keep together and come home at night; and it is said that one man can herd 2,000 of them with less trouble than two men can herd 2,000 sheep. They have no disease except that a few have been poisoned—it is supposed by eating dry buckeyes.

§ 213. *Poultry.*—Poultry command very high prices in this State, but all attempts to breed them on a large scale have proved unprofitable. Hens are worth from fifty to seventy-five cents each, and eggs from twenty-five to fifty cents per dozen. Chickens are healthy and increase rapidly in small poultry-yards or farms; but when more than five hundred are collected a fatal epidemic appears, and they die off. The disease seems to be a kind of apoplexy, for it attacks the fattest chickens, and they die suddenly. Several large henneries have been established, but all have failed; that is, so far as their purpose was the production of eggs and chickens for the table with a profit.

§ 214. *Bees.*—It was supposed, before 1853, that the honey-bee would not thrive in a climate so dry as that of California; but some hives brought to the State in that year, proved the error of the supposition. A good hive will increase in number, and store honey, twice as rapidly as in New York. Bees here are not idle during six months of the year as there, but busy during nine or ten months. They find their food in wild and cultivated flowers, in the blossoms of manzanita bushes, fruit-trees, grasses, clovers, and grains, in grapes, fruits, and honey-dew. They seem to thrive in the dryest portions of the State, where there are no cultivated fields and no flowers or green herbage. They are very fond of apricots, which they eat in places where the skin has been previously cut through by bugs. When the latter have made a hole, the bees come and eat side by side with the bugs, which are of the "lady-bug" kind, and other similar species. Many of the bees lose their lives in consequence of their fondness for the apricot. Either they eat too much, or they eat the meat after it has passed into the alcoholic fermentation; but whether intoxicated or surfeited, they are unable to get home, and they perish during the night. In places where the honey-dew is abundant, especially in the mountains on the eastern border of the Tulare Valley, the bees make honey very rapidly. Indeed, it has been the custom of several bee-keepers in California to move their bees about from place to place, according to the pasture and the season. Many swarms have gone off into the mountains, where they occupy holes in trees and clefts in rocks. The mountain honey resembles in taste that of the Eastern States and Northern Europe, while that made in the Coast Valleys has a peculiar flavor, which, it is said, is much like the honey of Mount Hymettus, where the bees have access to a great variety of wild flowers.

The State has 30,000 bee-hives, including 3,000 each in Monterey and Los Angeles Counties, 2,000 in San Diego, 1,500 in Sacramento, and 1,000 each in San Joaquin, Santa Clara, and Siskiyou. The hives are increasing in number more rapidly in Los Angeles and San Diego than in any other district. It is not rare for a hive to make two hundred pounds of honey in a season. The bees are exposed to constant danger from the bee-moth, and also from the bee-bird and lizard. The last two eat the bees while they are on the flowers; but the chief enemy is the moth, which gets into the hives and soon ruins them, if not discovered and ejected. On account of its depredations, the hives are usually unprofitable in the hands of persons who do not understand the business.

Many swarms of bees have gone off and made homes for themselves in hollow trees and clefts of rocks; and in several of the southern counties these wild swarms are so numerous that some persons find it profitable to hunt for them, and take their honey, and transfer the bees to their hives. The Los Angeles *News* thus describes the bee-hunter's plan:

"Proceeding out of the range of the pasturage of his own bees, he places a piece of burning wax on the ground, and adjacent to it he deposits a little honey. If there are any bees in the vicinity, the burning wax attracts them to the spot, and they soon alight upon the honey. The hunter watches the bee until it obtains its fill, when it at once takes flight for its hive. Sometimes he waits the return of the bee, which never fails so to do, accompanied by several of its confederates. Some of these the hunter captures, and places in a box. He then proceeds in the direction taken by the first bee. Having gone far enough, according to his judgment, he liberates one of the bees held captive, which flies onward in case the hive is not already past; if otherwise, the bee returns, and the hunter has to retrace his steps. Whenever he deems it necessary, the process of wax-burning is repeated. By these means it seldom takes many hours for the hunter to find the cave, rob it of comb, honey, and swarm, and carry all triumphantly to his own apiary."

In the San Fernando Mountain, an immense swarm, or a cluster of swarms, has established itself in a cleft of rock, and has collected a stock of honey estimated to weigh sixty tons.

§ 215. *Sericulture.*—Sericulture will probably become an important branch of Californian agriculture. China, Japan, France, and Italy, which are now the chief producers of raw silk, have thunder-storms and rains in summer, both very injurious to the young worm. Besides, our winters are not so cold, nor are our summers near the coast so hot, as at Lyons and Milan, the centers of the chief silk districts of Europe. The great drawback of that continent is, however, the bombyx plague, which attacks nearly all the worms hatched from eggs laid there; and for the last ten years the French and Italian silk-growers have been compelled to import eggs from remote countries, getting a large part of their supply from Japan, and of late years expending as much as $8,000,000 annually in these purchases. It is believed that California can furnish all the eggs needed by Europe at greater profit than any other country, and that in a few years she will be able to work up her own raw silk.

Silk worms have been bred here every year since 1860, but the business has not yet reached a steady and solid basis. Previous to 1867 it was experimental, but in that year an excitement was caused by a State premium, offering large money prizes for every plantation of mulberry trees, and for every large lot of cocoons, in proportion to their number. No restriction was made in the matter of quality, and some persons imagined that they could plant their trees as thick as in a nursery, that they could get as much premium for the poorest trivoltene cocoons after they had been hatched out, as for the best French animals prepared for reeling. Under this stimulus, the State produced 1,000,000 cocoons in 1868, 3,000,000 in 1869, and 12,000,000 in 1870, when the premium fever came to an end, and the bubble burst. It was found that many of the so-called mulberry plantations were mere nurseries, and were besides planted in wet places, where the worms could never thrive. As a consequence, a large proportion of them died; and many of the plantations have been dug up, and the cocooneries have been used for other purposes. There are now cocooneries at Sonoma, Mayfield, Crystal Springs, Nevada, Santa Clara, Santa Barbara, and Los Angeles; and about 2,000,000 cocoons have been made in 1873.

CHAPTER IX.

MINING.

§ 216. *Mining Products.*—Mining was until about 1860 the chief industry of the State, but it has now been surpassed by both agriculture and manufactures. The annual products of mining in California may be thus stated: Gold $20,000,000, lead $300,000, silver $1,000,000, quicksilver $3,000,000, coal $800,000, borax $100,000, asphaltum $50,000, petroleum $10,000, sulphur $50,000, and copper $100,000. The production of petroleum and borax is just commencing, and the yield of sulphur and copper is very irregular. The total is $25,400,000.

§ 217. *Number of Gold Miners.*—We have no official statistics of the number of gold miners in California, so we must ascertain the number by calculation from various sources.

The number of votes cast in 1872, and the number of Chinamen in the gold mining counties in 1870, were the following:

Counties.	Votes.	Chinamen.
Amador	1,760	1,619
Butte	1,219	2,070
Calaveras	1,659	1,431
Del Norte	238	216
El Dorado	2,402	1,551
Kern	459	142
Klamath	205	542
Mariposa	763	1,071

Counties.	Votes.	Chinamen.
Mono	138	41
Nevada	3,472	2,617
Placer	2,255	2,401
Plumas	792	908
San Bernardino	509	16
San Diego	873	71
Shasta	821	574
Sierra	1,300	809
Siskiyou	1,372	1,439
Stanislaus	1,130	305
Trinity	652	1,095
Tuolumne	1,536	1,511
Yuba	2,015	2,324
Total	25,567	22,760

The number of votes cast at the last Presidential election is probably within one-tenth of the total adult white males; so that, if we allow 28,000 for the white men, we shall have, with the Chinamen, about 50,000 men in these counties. It will be observed that we have excluded Los Angeles and Merced, which have a few gold mines, and Inyo and Alpine, which work no mines save those of silver. We have included San Bernardino and San Diego, in which mining is one of the chief industries, and Stanislaus and Yuba, in which, though the placers now yield little, they were once important.

Of the 50,000 men in the auriferous districts of California, there are not 30,000 now engaged in gold mining. Some of those counties which, fifteen years ago, were exclusively devoted to gold mining, are now predominantly agricultural. In Siskiyou, Tuolumne, Shasta, and Plumas, one white man out of two may work in a mine; in El Dorado, Placer, and Calaveras, one in three; in Kern, San Diego, and San Bernardino, one in four; in Yuba, Butte, and Stanislaus, one in five. If we allow that 18,000, or four-fifths, of the Chinamen, and 12,000, or nearly half of the white men, are miners—and these are very liberal estimates—we shall have a total of 30,000 gold miners. Miners may average 250 days of work in a year, and the 30,000 multiplied by that figure would give 7,500,000 days' work in a year, or $266 per day on an average. That sum is not discreditably small.

§ 218. *Profit of Gold Mining.*—The statement has been made that the gold produced in California cost more than it was worth. That gold mining was profitable to the miners, is shown by the fact that the business has been maintained now for nearly twenty-five years; and those who were engaged in it, as a class, have abundant reason to be pleased with their experience. Mining has certainly not been a source of loss to the State, which would have been little better than a desert to this day, if the auriferous deposits of the Sierra Nevada had not been discovered. It was the gold yield that filled our valleys with people, planted our orchards and vineyards, built our cities, the Panama Railroad, our transcontinental railroad, and our Coast railroad system; that established the mail steamer line to China; that opened Japan to civilization and trade, and that filled the North Pacific with commerce. Without the help of this magician, San Francisco Bay would probably have been of no more importance in the business of the United States, than Puget Sound is now.

The American Union, as a whole, has been greatly benefitted by the mines, which, though they drew away a large number of the most intelligent and active men from the Atlantic slope, yet gave a wonderful stimulus to all branches of industry, called out energies that would otherwise have been dormant, attracted hundreds of thousands of immigrants, gave the nation increased influence in the world, and poured into her lap more riches than had ever before been derived from one source within so short a time from its start, and by so few laborers. The addition of $1,000,000,000 in gold to the wealth of our nation within less than a quarter of a century, by 50,000 miners, contributed much to raise America to the position which she now holds in the industry and commerce of the world. Other nations did not profit so much, and some of them no doubt lost, for they were compelled to give ten days' work in their products for the gold obtained here in one day's work.

§ 219. *Gold Yield.*—The gold mines of the Sierra Nevada were discovered on the 19th of January, 1849; were first worked in May of that year; immediately began to be very productive in proportion to the men employed; and five years later reached their greatest yield, which was about $65,000,000 in 1853; and since, have been turning out less and less every year, excepting such irregularities as may arise from unequal seasons. The statistics of the annual exportation of treasure as manifested at the San Francisco Custom House, and given in the chapter on commerce, omit much that belong to the gold yield of California, and contain much that does not belong to it. From 1852 to 1860 large sums were carried away in dust by miners returning to the Eastern States, without report to the Custom House; and since 1860 large quantities of treasure from Idaho and Nevada have been made part of the exports from San Francisco. It is safe to estimate the total gold product of California in the twenty-five years, from the 1st of July, 1848, to the 30th of June, 1873, at $1,000,000,000.

§ 220. *Gold Mines.*—Our gold mines are divided into placer and quartz. In the former, the metal is found imbedded in layers of earthy matter, such as clay, sand, and gravel; in the latter, it is encased in veins of rock. The methods of mining must be adapted to the size of the particles of gold, and the nature of the material in which they are found. In placer mining, the earthy matter containing the gold, called "pay-dirt," is washed in water, which dissolves the clay and carries it off in solution, and the current sweeps away the sand, gravel, and stones; while the gold, by reason of its higher specific gravity, remains in the channel, or is caught with quicksilver.

In quartz mining, the auriferous rock is ground to a very fine powder, the gold in which is caught in quicksilver, or on the rough surface of a blanket, over which the fine material is borne by a stream of water. About two-thirds of our gold is obtained from the placers, and one-third from the quartz.

A mine is defined in our dictionaries to be "a subterraneous work or excavation for obtaining metals, metallic ores, or mineral substances"; but this definition does not apply to our placer mines, which are places where gold is taken from alluvial deposits. Most of the work is not subterraneous; it is done in the full light of day. In some of the claims the pay-dirt lies within two feet of the surface; in others it lies much deeper, but all the superincumbent matter is usually swept away.

§ 221. *Placers.*—Placer mines are divided into many classifications. The first and most important is into deep and shallow. In the former the pay-dirt is found deep, twenty feet or more beneath the surface; in the latter near the surface. The shallow or surface diggings are chiefly found in the beds of ravines or gullies, in the bars of rivers, and in shallow flats. The pay-dirt is usually covered by layers of barren dirt, which is sometimes washed, and sometimes left undisturbed, while the pay-dirt is taken out from underneath it by tunnels or shafts. So far as our present information goes, we have reason to believe that no gold country ever possessed so large an extent of paying placer mines, with the pay-dirt so near the surface, and with so many facilities for working them, as California. In Australia, the diggings are very deep and spotted, that is, the gold is unevenly distributed, and the supply of water for mining is scanty. In Siberia, the winter is terribly cold during six months of the year. In Brazil, the diggings were not so extensive nor so rich as in this State. Here we have numerous large streams coming down through the mining districts, very large bodies of pay-dirt, and a mild climate.

After dividing placers into deep and shallow, the next classification will be according to their topographical position, as into hill, flat, bench, bar, river-bed, ancient river-bed, and gulch mines. Hill diggings are those where the pay-dirt is in or under a hill. Flat diggings are in a flat. Bench diggings are in a "bench," or narrow table on the side of a hill above a river. Benches of this kind are not uncommon in California, and they often indicate the place where the stream ran in some very remote age. Bars are low collections of sand and gravel at the side of a river, and above its surface at low water. River-bed claims are those beneath the surface of the river at low water, and access is obtained to them only by removing the water from the beds by flumes or ditches. Ancient river-bed claims are those in which the gold was deposited by streams, in places where no streams now exist. Gulch claims are those in gullies which have no water save during a small part of the year. A "claim" is the mining land owned or held by one man or a company.

The placer mines are again classified according to the instruments with which they are wrought. There are sluice claims, hydraulic claims, tunnel claims, dry washing, dry digging, and knife claims. In 1849 and 1850, the main classification of the placers was into wet diggings and dry diggings; the former meaning mines in the bars and beds of rivers, and dry diggings were those in gullies and flats, where water could be obtained only part of the year, or not at all. That classification was made while nearly all the mining was done near the surface, before the great deposits of pay dirt in the hills had been discovered, and before ditches, sluices, and the hydraulic process had been introduced. The "dry diggings," which for several years furnished nearly half of the gold yield of the State, are now, with a few unimportant exceptions, exhausted, or left to the attention of the Chinamen.

The purpose of all placer miners is not to catch all the gold in the dirt which they wash, but to catch the greatest possible quantity within a given time. It is not supposed that any process used in gold mining catches all the metal. Part of it is lost; in some processess a considerable proportion. The general estimate in California is, that one-twentieth of the gold in the dirt which is washed is lost. Many of the particles are so very small as to be invisible to the naked eye, and so light that their specific gravity does not avail to prevent them from being carried away by the water, like sand. The larger pieces will sink to the bottom and resist the force of the water; the smaller the particles, the greater the danger that they will be borne away. Many devices have been tried to catch all the gold, but none have succeeded perfectly; and some which have caught a portion of what escaped from the ordinary modes of mining, have been found to cost more than their yield. The miner does not grieve about that which he cannot catch. He is not careful to catch all that he could. His purpose is to draw the largest possible revenue per day from his claim. He does not intend to spend many years in mining, or if he does, he has become thriftless and improvident. In either case, he wishes to derive the utmost immediate profit from his mine. If his claim contain a dollar to the ton, and he can save five dollars by slowly washing only six tons in a day, while he might make ten dollars by rapidly washing fifteen tons in a day, he will prefer the latter result, though he will lose twice as much of the precious metal by the fast as by the slow mode of working. The object of the miner is the practical dispatch of work, and his success will depend to a great extent upon the amount of dirt which he can wash within a given space of time. He regrets that any of the gold should be wasted, because it escapes from his sluice and his pocket, not because it is lost to industry and commerce.

§ 222. *Ditches.*—Water is the great agent of the placer miner, and the element of his power. Its amount is the measure of his work, and its cost the measure of his profit. With an abundance of water he can wash every thing; without water he can do little or nothing. Placer mining is almost entirely mechanical, and of such a kind that no accuracy of workmanship or scientific or literary education is necessary to mastery in it. Nearly all the water used by miners is supplied by ditches, which therefore occupy an important place in the mining of California. Indeed, it may be said that without them the mines of the State would be relatively insignificant. At least four-fifths of the gold is obtained with the assistance, direct or indirect, of ditch water. There are very few springs in the mining regions, the bed rock being usually slate with perpendicular cleavage, through which the water soaks down to the lowest levels. The permanent streams are found only at long intervals, and run in deep, steep, and narrow channels. Nature has furnished no adequate supply of water near the surface for towns or for quartz mills; so they, as well as the hydraulic pipes and sluices, must depend upon ditch water, which thus is an indispensable requisite to the production of four-fifths, perhaps nineteen-twentieths, of the gold. It is fortunate that the mountain ridge east of the mining districts rises high into the region of snow, where the moisture that falls from the atmosphere in winter is condensed and retained until summer and fall. But without the ditches, this moisture would do little good to the miners, since there are few camps near springs or on the immediate banks of constant streams.

§ 223. *Flumes.*—Flumes are usually made with boards, an inch and a half thick for the bottom, and an inch and a quarter thick for the sides. At intervals of two and a half feet there is a support for the flume box, consisting of a sill, posts, and cap. The sills are four inches square; the posts three by four inches, and the caps one and a half by four inches. To erect a flume 25 feet high, costs about twice as much as to lay one on the level of the ground, and at 60 feet it costs about four times as much. The annual repair of a flume is about one-eighth of its original cost, in favorable circumstances. If the flume is left dry several months, the repairs may be more, for the sun warps and splits the boards, and draws the nails. A flume box, 40 inches wide by 20 inches deep, with a grade of 13 feet to the mile, will carry about 800 inches, and such a flume built on the surface of the ground will cost now at the rate of $4,000 per mile, near a saw-mill. The boards are put in the flume rough, but are always battened, and sometimes caulked. The cheapest flume costs twice as much as the cheapest ditch of the same capacity, and the repairs of a flume cost 90 per cent. more than those of a ditch. The duration of a high flume is on an average about six years, and of a low one, eight or ten. For the first two or three years after the construction of a ditch, there is much trouble from gopher holes and slides.

The flumes in the highest portions of the Sierra, and especially about Howland Flat and La Porte, are troubled by the snow, and much labor is spent on them every winter. The weight of the snow is so great that after every snow-storm, or while it is in progress, a man must go along and clear the flume with a shovel. In cases where the flume is on a hill-side, it is necessary to shovel away the snow from the upper side of the flume, for the mass moves down hill with tremendous weight, though with very slow motion, and no flume could resist it.

§ 224. *Iron Pipe.*—The use of iron pipe in the form of an inverted siphon, instead of a high flume, for the purpose of carrying water across ravines, has been a great improvement and saving in the ditch business. Near Placerville, water is carried across a depression 190 feet deep and 1,600 feet long, in a pipe that cost $900, whereas a flume would have cost $25,000. Not only is it cheaper, but it can be used where fluming is pecuniarily impossible, as in crossing ravines 400 feet deep.

The sheet iron used in making pipe, comes in sheets two feet wide and six feet long. The common sizes of pipe are 7 and 11 inches in diameter, made in joints two feet long. A sheet makes two joints of 11-inch pipe, and three of seven-inch, and 11 joints are riveted together to make a section 20½ feet long. At the end of each section, as pipes are usually made, there is an ear or hook riveted on each side, and when the foot of one section is thrust into the head of another, a wire is wrapped round the opposite ears or hooks to tie the sections together. In case a pipe is laid on a hill-side running down, each section is tied at the head to a post, to keep it in place; and the post may be supported by a board, placed edgewise and crosswise in the ground. About an inch and a half of space is allowed for the lap at the end of the sections. The ends need to be made with precision, so that they will be water-tight, without packing. The pipe should be put together in a straight line, and the sections should be driven together with a sledge hammer, striking a board laid across the end of the section. The pipe needs to be coated with tar to preserve it, and if very large it may be coated inside as well as out.

The cost of 11-inch pipe made of No. 20 iron is about 75 cents per foot. The thickness of the iron depends upon the amount of pressure and the size of the pipe. The larger the pipe, the thicker the iron should be. The pressure at 190 feet is 88 pounds per square inch, and No. 20 iron is strong enough for that, if the pipe be not more than 11 inches in diameter.

§ 225. *Expensive Construction.*—The first experiments in ditching in 1850 were magnificently successful. The canals were short and small, and the water was either sold at a very high price, or was used in working out rich claims. It was not uncommon for several years for little ditches to repay the cost of construction in a couple of months. It was supposed that the right to the water of a good stream would be worth a fortune. The merchants in each town considered it their interest to encourage and assist the miners to bring in water, so as to increase the population, gold production, and trade. The country was full of enterprise and money, for which there was not much other use. Numerous ditch companies were formed, to bring water from the elevated regions in the mountains, and many had invested too much to withdraw before any of them had learned the business before them by experience. The work was done when labor was very high; the price for common laborers being $8 per day, and lumber was $100 per thousand feet. Before the canals were finished, wages had fallen 50 per cent. or more, and the work done was worth in the market only half its cost. Besides, in 1851 and 1852 the common price for water was 50 cents or $1 an inch, and the ditch companies made their calculations upon charging those figures; but before the completion of the ditches the best claims in the ravines had been exhausted, and there was not enough rich ground left to pay high prices for all the water. Flumes which do not last more than ten, and sometimes become worthless in six years, were used to cross deep chasms where iron pipe would have been much better and cheaper. Some of these structures were wonderful works. The Golden Rock flume near Big Oak Flat was 256 feet high, and supported by an immense trestle-work; and after it was blown down, a durable iron pipe at less than a quarter of the cost supplied its place equally well. On account of the bad engineering and the inexperience of the early ditch builders, the exhaustion of the placers, and other causes, the mining ditches which cost not less than $20,000,000 are now worth probably not more than $2,000,000. The total number of mining ditches in 1871, according to the State Surveyor General's report, was 516, and their aggregate length 4,800 miles, and their daily supply of water 171,000 inches.

§ 226. *Measurement of Water.*—Water is sold by the inch, and usually an inch is the amount which escapes through an orifice an inch square, with the water six inches deep above the top of the orifice. That is called a six-inch head or pressure. If a large quantity is sold, the orifice may be two or three inches high. The mode of measurement, however, is not uniform. In some places the pressure is nine or ten inches; in others there is no pressure, but the quantity that escapes through an orifice an inch wide, and three inches high, without pressure, is called an inch.

In calculations made by machinists it is often necessary to use the term "an inch of water," and by common consent that phrase is accepted now to mean a supply of two and one-third cubic feet of water passing a given point in a minute of time, equivalent to 21,000 gallons in 24 hours. The mining ditches of the State carry 171,000 inches in the aggregate, but much of this is used for only ten hours a day, and we may consider it equal to 100,000 inches running 24 hours, or 2,000,000,000 gallons a day, more than all the great city aqueducts of Europe supply. Single hydraulic claims use 3,000 inches each, or 60,000,000 gallons daily; or more than New York City with nearly a million inhabitants gets from Croton aqueduct. The price of water, as sold by the mining ditch companies, varies from five to twenty cents per inch for ten hours, the average being about ten cents.

§ 227. *Cleaning up.*—The separation of the gold, amalgam, and quicksilver, from the dirt in the bottom of the sluice, is called "cleaning up"; and the period between one "cleaning up" and another is called a "run." A run in a common board-sluice usually lasts from six to ten days; in a large hydraulic claim, one month. Ordinarily the sluice runs only during daylight, but in hydraulic claims the work continues night and day. Cleaning up occupies from half a day to three days, and therefore must not be repeated very often, because it consumes much time. In some sluices the cleaning up does not occur until the bed of the sluice has been worn out or much bruised by the wear of the stones and gravel. Cleaning up in small sluices is considered light and pleasant work, and is often reserved for Sunday. At the time fixed the throwing in of dirt ceases, the water runs until it becomes clear, the false bottom of the sluice is taken up in sections, and the heavy sand, amalgam, and quicksilver, taken up in pans. After separating the sand, the quicksilver and amalgam from the sluice are put into a buckskin cloth, and pressed, so that the liquid metal passes through, and the amalgam is retained. The amalgam is then heated, to drive off the mercury. This may be done either in an open pan or in a close retort. In the former, the quicksilver is lost; in the latter, it is saved. The pan is generally preferred. Often a shovel or plate of iron is used. Three pounds of amalgam, from which the liquid metal has been carefully pressed out, will yield one pound of gold. The gold remaining after the quicksilver has been driven off by heat from the amalgam, is a porous mass, somewhat resembling sponge-cake in appearance.

§ 228. *Riffle-Bars.*—The riffle-bars used as false bottoms in sluices, are usually sawed longitudinally with the grain of the wood, but "block riffle-bars" are considered preferable; the latter are cut across the tree, and the grain stands upright in the sluice-box. The block riffle-bars are three times more durable than the longitudinal; and as the latter kind are worn out in a week in some large sluices, there is a considerable saving in using the former.

§ 229. *Double Sluices.*—Sluices are sometimes made double—that is, with a longitudinal division through the middle, so that there are two distinct sluice-boxes side by side. Two companies may be working side by side, so that it will be cheaper for them to build their sluices jointly. Another device for saving gold in sluices is the "under-current box." There is a grating of iron bars in the bottom of a box, near the lower end of a sluice; and under this grating is another sluice, with an additional supply of clean water, and with a lower grade. The grating allows only the fine material to fall through; and the current of water being moderate, many particles of gold, that would otherwise be lost, are saved. Sometimes the matter from the under-current box is led back to the main sluice.

§ 230. *Rock-Sluices.*—Large sluices are frequently paved with stone, which makes a more durable false bottom than wood, and catches fine gold better than riffle-bars. The stone bottoms have another advantage—that it is not so easy for thieves to come and clean up at night, as is often done in riffle-bar sluices. But, on the other hand, cleaning up is more difficult and tedious in a rock-sluice, and so is the putting down of the false bottom after cleaning up. The stones used are cobbles, six or eight inches through at the greatest diameter, and usually flattish. A good workman will pave eight hundred square feet of sluice-box with them in a day; and after the water and dirt have run over them for an hour, they are fastened very tightly by the sand collected between them. In large sluices, wooden riffle-bars are worn away very rapidly—the expense amounting sometimes, in very large and long sluices, to twenty or thirty dollars a day; and in this point there is an important saving by using the stone bottoms. They are used only in large sluices, and they generally have a grade of twelve or fourteen inches to the box of twelve feet.

§ 231. *Hydraulic Washing.*—Most of the gold of the placer mines of California is obtained by hydraulic washing—that is, throwing water under a strong pressure against the banks of auriferous gravel, which is then carried by the water into a sluice. The hydraulic process is applied only in claims where the dirt is deep and where the water is abundant. If the dirt were shallow in the claim and its vicinity, the necessary head of water could not be obtained. Hydraulic claims are usually in hills. The water is led along on the hill at a height varying from fifty to five hundred feet above the bed-rock, to the claim at the end or side of the hill, where the water, playing against the dirt, soon cuts a large hole, with perpendicular or at least steep banks. From the top of the bank, a hose or iron pipe extends down to the bottom of the claim. The hose is of heavy duck, sometimes double sewn, by machine. When full, it is from four to ten inches in diameter, and will bear a perpendicular column of water fifty feet high; but a greater height will burst it. Now, as the force of the stream increases with the height of the water, it is a matter of great importance to have the hose as strong as possible; and for this purpose, in some claims, it is surrounded by iron bands, which are about two inches wide, and are connected by four ropes which run perpendicularly down. The rings are about three inches apart. The " crinoline hose," thus made, is very flexible, and will support a column of water one hundred and fifty or two hundred feet high. The pipe at the end of the hose is like the pipe of a fire-engine hose, though usually larger. Sometimes the pipe will be eight inches in diameter where it connects with the hose, and not more than two inches at the mouth; and the force with which the stream rushes from it is so great, that it will kill a man instantaneously, and tear down a hill more rapidly than could a hundred men with shovels. One or two men are required to hold the pipe when it is to be held; but usually it is supported on a frame-work. These remarks apply, however, mainly to the small claims; in the larger ones, the water is brought down the hill in iron pipe, whence it passes into a patent nozzle which will discharge three, five, or eight hundred inches of water through an orifice from four to eight inches in diameter; the speed, in consequence of the pressure, being ten times as great as at the top of the hill. Such a stream, under a head of three or even five hundred feet, has terrific force, and will make boulders a foot through jump twenty feet into the air, when it strikes them.

The miners usually turn the stream upon the bank near its bottom until a large mass of dirt tumbles down, and then they wash this all away into the sluice; when they commence at the bottom of the bank again, and so on. If the bank is one hundred and fifty feet high, the mass of earth that tumbles down is of course immense, and the pipemen must stand far off for fear that they will be caught in the avalanche. Such accidents are of daily occurrence, and the deaths from this cause probably are not less than a score every year in the State. Often legs are broken; still more frequently the pipemen have warning, and escape in time. When men are buried in the falling dirt the water is used to wash them out. In some claims, the pipe will tear down more dirt than the sluice can wash; in other claims, the sluice always demands more dirt than the pipe can bring down. In the latter case, blasting may be used to loosen the dirt, or the miners may undermine the bank, leaving a few columns of dirt for support; and then these being washed away by the pipe, the whole bank comes tumbling down.

In hydraulic claims all the dirt is washed; in all other kinds of claims, such dirt as contains no gold is thrown to one side, or "stripped off." "Hydraulic mining" is the highest branch of placer mining; it washes more dirt and requires more water, and a larger sluice, than any other kind of mining. The number of men employed in a hydraulic claim, however, is usually small—from three to six—the water doing nearly all the work. In some claims a man is constantly employed with a heavy sledge-hammer in breaking up large stones, so that the pieces may be sent down the sluice. One man attends to the sluice, and sees that the dirt does not choke up in the sluice, or in the claim above it.

The quantity of dirt that can be washed with a hydraulic pipe depends upon various circumstances—such as the supply of water, the height of its fall, the toughness of the dirt, and the amount of moisture in it. More can be washed in winter than in summer, because the dirt is then moister, and requires less water to loosen and dissolve it. The quantity of water used in a hydraulic claim is from forty inches to three thousand. With one hundred inches, at least thirty cubic yards can be washed in ten hours, on an average; and three men can do all the work. If there were a cent's worth of gold in each cubic foot, the thirty cubic yards would yield eight dollars and ten cents per day, or two dollars and seventy cents to the man, exclusive of the cost of water. The water usually costs ten cents an inch per day, so that one hundred inches would cost ten dollars. Allowing for the water at that rate, a claim in which thirty cubic yards could be washed in a day with one hundred inches of water, and in which the dirt contained five cents to the cubic foot, would leave a net pay of ten dollars and sixteen cents to each man per day.

One hydraulic company washed two hundred and twenty-four thousand cubic feet of dirt in six days, using two hundred inches of water, and employing ten men. The wages of the men amounted, at four dollars per day each, to two hundred and forty dollars; the water cost three hundred dollars; and the waste of quicksilver, and wear of sluice, perhaps one hundred dollars more, making a total expenditure of six hundred and forty dollars; and the gold obtained was three thousand dollars, leaving a clear profit of twenty-three hundred and fifty dollars. The dirt contained one cent and a fifth of gold in a cubic foot.

Another company used two thousand inches of water for a hundred days in washing down 1,000,000 cubic yards of gravel, obtained $32,000 gross, or three cents and a fifth to a cubic yard of gravel, and netted $12,000, or one cent and a fifth to a yard. The area of the ground washed down was 1,100 feet long, 300 feet wide, and 80 feet deep, and the quantity of gravel carried down every day on an average 10,000 cubic yards.

The greater the amount of water used, the greater the proportionate amount of dirt that can be washed, and the greater the proportionate profits. It is far more profitable to have a large sluice than a little one, if the water and dirt can be obtained in abundance. Usually, in a hydraulic claim, the dirt is washed down to the bed-rock; but in some places the washing stops far above the bed-rock, because there is no outlet for the water.

§ 232. *Ground-Sluice.*—All the sluices hitherto mentioned and described have wooden boxes, but the ground-sluice has no box: the water runs on the ground. The place selected for the ground-sluice is some spot where there is a considerable supply of water, a steep descent for it, and much poor dirt. The stream is turned through a little ditch, which the miners labor to deepen and enlarge; and when it is deep they prize off the high banks so that the dirt may fall down into the ditch. This is a very cheap and expeditious way of washing, but it is not applied extensively.

§ 233. *Cradle.*—The rocker or cradle is still less than the tom and inferior in capacity. It bears some resemblance in shape and size to a child's cradle, and rests upon similar rockers. The cradle-box is about forty inches long, twenty wide, and four high, and it stands with the upper end about two feet higher than the lower end, which is open, so that the tailings can run out. On the upper end of the cradle-box stands a hopper or riddle-box, twenty inches square, with sides four inches high. The bottom of this riddle-box is of sheet-iron, perforated with holes half an inch in diameter. The riddle-box is not nailed to the cradle-box, but can be lifted off without difficulty. Under the riddle is an "apron" of wood or cloth, fastened to the sides of the cradle-box and sloping down to the upper end of it. Across the bottom of the cradle-box are two riffle-bars about an inch square, one in the middle, the other at the end of the box. The dirt is shoveled into the hopper, the "cradler" sits down beside his machine, and while with one hand with a ladle he pours water from a pool at his side upon the dirt, with the other he rocks the cradle. With the water and the motion the dirt is dissolved, and carried down through the riddle, falling upon the apron, which carries it to the head of the cradle-box, whence it runs downward and out, leaving its gold, black sand, and heavier particles of sand and gravel behind the riffle-bars.

§ 234. *The Sluice.*—The board-sluice is a long wooden trough, through which a constant stream of water runs, and into which the auriferous dirt is thrown. The water carries away the clay, sand, gravel, and stones, and leaves the gold in the bottom of the sluice, where it is caught by its gravity and by quicksilver. The board-sluice was for a time the great washing machine, and the most important instrument used in the placer mining of California. It washed nearly all the dirt, and caught nearly all the placer gold. It was invented here, although it had previously been used elsewhere; and it has been more extensively employed here than in any other country. It is not less than fifty feet long, nor less than a foot wide, made of boards. The width is usually sixteen or eighteen inches, and never exceeds five feet. The length is ordinarily several hundred, and sometimes several thousand feet.

§ 235. *Pan.*—The pan is used in all branches of gold mining, either as an instrument for washing, or as a receptacle for gold, amalgam, or rich dirt. It is made of stiff tin or sheet-iron, with a flat bottom about a foot across, and with sides six inches high, rising at an angle of forty-five degrees. A little variation in the size or shape of the pan will not injure its value for washing. Sheet-iron is preferable to tin, because it is usually stronger and does not amalgamate with mercury. The pan is the simplest of all instruments used for washing auriferous dirt. Some dirt, not enough to fill it full, is put in, and the pan is then put under water. The earthy part of the dirt is rapidly dissolved by the water, assisted by the shaking of the pan and the rolling of the gravel from side to side, and forms a mud, which runs out while clean water runs in. The light sand flows out with the thin mud, while the lumps of tough clay and the large stones remain. The stones collect on the top of the clay, and they are scraped together with the fingers and thrown out. This process continues, the pan being gradually raised in the water, and its outer edge depressed, until all the earthy matter has been dissolved, and that, as well as the stones, swept away by the water, while the gold remains at the bottom. Panning is not difficult, but it requires practice to learn the degree of shaking which dissolves the dirt and throws out the stones most rapidly without losing the gold. Amalgam can be separated from dirt, by washing, almost as well as gold. In panning-out, it frequently happens that considerable amounts of black sand containing fine particles of gold are obtained, and this sand is so heavy that it cannot be separated from the gold by washing, while it is easily separated in that way from gravel, stones, and common dirt. The black sand is dried, and a small quantity of it placed in a "blower," a shallow tin dish open at one end. The miner then, holding the pan with the open end from him, blows out the sand, leaving the particles of gold. He must blow gently, just strong enough to blow out the sand, and no stronger. From time to time he must shake the blower so as to change the position of the particles, and bring all the sand in the range of his breath. The gold cannot be cleansed perfectly in this manner, but the sand contains iron, and the little of it remaining is easily removed by a magnet. The blower should be very smooth, and made of either tin, brass, or copper.

§ 236. *Dry Washing.*—Dry washing is a method of winnowing gold from dirt. In many parts of the mining districts of California, water cannot be obtained during the summer for mining purposes. The miner therefore manages to wash his dirt without water. He takes only rich dirt, and putting it on a rawhide, he pulverizes all the lumps and picks out the large stones. He then with a large flat basin throws the dirt up into the air, catches it as it comes down, throws it up again, and repeats this operation until nothing but the gold remains.

§ 237. *Puddling-Box.*—The puddling-box is a rough wooden box, about a foot deep and six feet square, and is used for dissolving very tough clay. The clay is thrown into the box, with water, and a miner stirs the stuff with a hoe until the clay is all thoroughly dissolved, when he takes a plug from an auger-hole about four inches from the bottom, and lets the thin solution of the clay run off, while the heavier material, including the gold, remains at the bottom. He then puts in the plug again, fills up the box with water, throws in more clay, and repeats the process again and again until night, when he cleans up with a cradle or pan. The puddling-box is used in very few places in California.

§ 238. *Tunnel Claims.*—Much of the placer gold has been obtained from tunnel claims, most of which have been in the beds of dead rivers, in places where the pay dirt was covered by a great depth of barren or hard material, or where the supply of water was not sufficient for hydraulic washing. Thus, in the Tuolumne Table Mountain, tunnels were necessary to reach the gold. Among the principal tunnel mining camps are Forest Hill, Bath, Alleghany, Minnesota, Forest City, Oregon City, and Howland Flat, all on the lines of dead rivers. A tunnel, in Californian mining, is an adit or drift entering a hill-side, or running out from a shaft. Mining tunnels are usually nearly horizontal—those entering hill-sides having a slight ascent, for the double purpose of draining the mine, and to facilitate the removal of the pay dirt. In a few hills the tunnels run downward, at an angle of twenty degrees or more, to avoid veins or ledges of rock, which would have to be blasted through if the tunnel were cut horizontally; but this can only be done with safety in hills which are drained by older horizontal tunnels. The mining tunnel does not run through a hill, but only into it. The length of tunnels varies greatly; the longest are about a mile. The usual height is seven feet, the width five feet. Ordinarily the top must be supported by timbers, to prevent it from falling in, and not unfrequently the sides must also be protected by boards. The cost of cutting a tunnel varies from two to forty dollars a longitudinal foot, according to the nature of the ground, the cost of getting timbers, etc. Tunnels are frequently made by companies of eight or ten men, of whom one-half may be merchants, lawyers, physicians, or office-holders, and the remainder laboring miners. The latter class do the work the former furnish provisions and tools, and a certain amoun of cash weekly, until the pay-dirt is reached.

§ 239. *Shafts.*—Shafts are used in prospecting, and also in mining, where the claims are deep and cannot be reached by either the hydraulic process or the tunnel. The prospecting shaft is sometimes sunk into hills supposed to be auriferous, where the shaft is far less expensive than the tunnel. After the shaft demonstrates that the dirt is rich, and precisely the altitude at which it lies, a tunnel is cut to strike it. The shaft may be the cheaper for prospecting, but the tunnel is usually the cheaper if any large amount of dirt is to be taken out.

The shaft is dug by one man in the hole, and one or two are employed at a windlass in hauling up the dirt. Mining shafts in placer diggings are rarely over one hundred feet deep; but one was dug in Trinity County to the depth of six hundred feet, for the purpose of prospecting. It found neither pay-dirt nor the bed-rock.

§ 240. *River Mining.*—River mining is mining for gold in the beds of rivers, below low-water mark. The only practicable method of doing this is by damming the stream, and taking the water out of its bed in a ditch or flume. It has been proposed by persons who never saw the mines, to get the gold by dredging, or with a diving-bell; but such schemes are absurd in the eyes of miners. The rivers in which the gold is found are mountain-torrents, in which a canoe can scarcely float in summer, much less a dredging-machine; and any large scoop working under water would miss the crevices and corners in the rocks, where most of the gold is found. As the water is very seldom more than a couple of feet deep, a diving-bell would be of little service. The flume, the ditch, and the wing-dam are the chief tasks of the river-miner. The ditch is rarely used, because the banks of the mining-streams are usually so steep, high, rocky, and crooked, that a flume is cheaper. The wing-dam is not often used, because the river-beds are in most places too narrow. The flume is almost universally employed.

§ 241. *Beach Mining.*—Beach mining is the business of washing the sands of the ocean-beach. Between Point Mendocino, in California, and the mouth of the Umpqua River, in Oregon, the beach-sand contains gold, and in some places it is very rich. The beach is narrow, and lies at the foot of a bluff bank of auriferous sand. In times of storm, the waves wash against this bank, undermine it, sweep away the pieces which tumble down, leaving the gold on the beach. The gold is in very fine particles, and it moves with the heavier sand, which alters its position frequently under the influence of the waves and surf. One day, the beach will have six feet depth of sand; the next, there will be nothing save bare rocks. The sand differs greatly in richness at various times: one day, it will be full of golden specks; a few days later, at the same place, it will be barren. The sand in the mean time has been moved by the waves, and replaced by other sand.

It is a very difficult matter to know where the sand is rich and where it is not. The companies employed in mining on the beach number about ten men; and there is a foreman, who rides out early every morning, following the beach about two miles to the northward and two miles to the southward of the camp, for the purpose of finding where the sand is the best. So changeable is the sand, that a new examination is made every day; and only three or four men are supposed to be good judges of the quality of sand, from its appearance.

When the foreman has selected a place, he orders all the men to it, and they go with twenty pack mules, which carry the sand in *alforjas*, or rawhide sacks, to the place of washing, which is up on the bluff, probably a mile or more distant from the spot where the sand is obtained. It happens occasionally that the foreman rides long distances on the beach, and sometimes he will order the sand to be obtained ten miles from the washing place. The sand must, of course, be very rich to pay for such transportation, but the beach sand at times in the sunlight is said to be actually dazzling yellow with gold. The purpose of going upon the bluff to wash it is to get fresh water for washing; for the sea water is not so good, nor can it be obtained conveniently. The richest dirt is that the farthest down on the beach, so still weather and low tide are the best times for getting it. When a rich place is discovered low down on the beach, great exertions are made to get as much of the sand as possible before the tide rises. When high tide and storm come together, little can be done. The sand, having been separated from all clay and soluble matter by the action of the sea, is very easily washed, and all collected in a month can be washed in two days in a sluice.

§ 242. *Placer Prospecting.*—"Prospecting," or the search for gold deposits, does not require much experience or scientific knowledge. The following are some general rules for the prospector:

1. Gold probably exists in every district where granite, slate, and quartz veins are found together or in near proximity to one another.

2. If there is any gold in a district, it is to be found in the beds of the larger ravines.

3. Profitable diggings are to be found only in the mountains, or in the plain immediately below them.

4. The gold, if any, is to be found by digging to the bed-rock in the beds of gullies or streams, at the mouths of cañons, or in bars at the lower ends of rapids, at low stages of water. If there be any gold in the basin of a river, some particles of the metal will be found in its bars above the level of low water.

5. Gold is most abundant in places where the bed is nearly level, just below long and steep pitches; and more metal collects where the bed-rock is rough than where it is smooth.

6. In a country rich in gold, a pan of dirt taken from the bed-rock of a large ravine will usually show some specks of the metal.

7. The smaller and smoother the particles, the farther they have come.

The pan is used for washing the dirt to be prospected.

§ 243. *Quartz Mining.*—Quartz mining differs much from placer mining. For the former, more capital, more experience, more complicated machinery, and richer material, are required than for the latter. The placer miner throws the dirt into the water, which then does the work; whereas the pulverizing of rock is a nice operation. Quartz requires a mill and water power; placer dirt is washed in a simple sluice. Dirt containing ten cents in the cubic yard may pay the hydraulic miner, but the quartz miner must have a hundred times as much in a cubic yard of vein-stone, or he cannot work. The placer gold, when freed from the baser material surrounding it, is much of it in coarse particles, which are easily caught by their specific gravity; the quartz gold must be reduced to a fine powder before it can be set free, and with the fineness of the particles increases the difficulty of catching them.

§ 244. *Prospecting for Quartz.*—Auriferous quartz lodes are often found by accident. Not unfrequently it happens that a rich streak of pay-dirt in a placer claim is followed up to the quartz claim from which it came. While miners are out walking or hunting, they occasionally will come upon lodes in which the gold is seen sparkling. Some good leads have been found by men employed in making roads and cutting ditches. The quartz might be covered with soil, but the pick and shovel revealed its position and wealth. In Tuolumne County, in 1858, a hunter shot a grizzly bear on the side of a steep cañon, and the animal tumbling down, was caught by a projecting point of rock. The hunter followed his game, and while skinning the animal, discovered that the point of rock was auriferous quartz. In Mariposa County, in 1855, a miner was attacked by a robber, and the former saw a sparkle behind his assailant at a spot where a bullet struck a wall of rock. He killed the robber, and found that the rock was gold bearing quartz. In Nevada County, several years ago, a couple of unfortunate miners who had prepared to leave California, and were out on a drunken frolic, started a large boulder down a steep hill. On its way down, it struck a brown rock and broke a portion of it off—exposing a vein of white quartz which proved to be auriferous, induced the disappointed miners to remain some months longer in the State, and paid them well for remaining. Science and experience do not appear to give much assistance in prospecting for quartz lodes. Chemists, geologists, mineralogists, and old miners, have not done better than ignorant men and new-comers. Most of the best veins have been discovered by poor and ignorant men. Not one has been found by a man of high education as a miner or geologist. No doubt, geological knowledge is valuable to a miner, and it should assist him in prospecting; but it has never yet enabled anybody to find a valuable claim.

It is useless to prospect for auriferous quartz in a country where no placer gold has been found. If the metal exists in the rock, some of it will also be found in the alluvium, and it can be discovered there more readily than in the vein. After the placers have been found, then search should be made for the quartz. The following rules are serviceable:

1. If a ravine is rich in gold to a certain point and barren above, look for a quartz vein in the hill-sides just above the place where the richness ceases.
2. A line of pieces of quartz rock observed in a hill-side, probably indicates the course of a quartz vein.
3. If a ravine crosses a quartz vein, fragments of the rock will be found in its bed below.
4. A large quartz vein will often show its presence in the topography of the country, by forming hills in those spots where the rock happens to be very hard.
5. Quartz can be found and the veins traced with comparatively little labor in the steep banks of cañons, where the rock is base or is covered with but little soil.
6. If a quartz vein contains gold, some of the metal may be perceptible to the naked eye.

§ 245. *Quartz Mining as a business.*—Many fine fortunes have been lost in gold-quartz mining, and it is proper to give warning to the ignorant against the dangers that beset the business. Here are a few remarks for the consideration of inexperienced persons solicited to take an interest in quartz mines.

1. Gold quartz mining is one of the most uncertain of all occupations.
2. No amount of experience, scientific knowledge, and prudence, will secure the investor against loss in it.
3. Many of the men engaged in it are very bold, and their statements must not be accepted without great caution, even when there is proof of their sincerity.
4. No one should risk more in gold quartz than he can afford to lose without serious inconvenience.
5. The presence of large lumps of gold in a vein, is no evidence of a profitable mine. Most of the best mines have had little rich rock; and the finest specimens have come from mines that are not now worked. It is the large supply of paying quartz, and not the extraordinary richness of small pieces, that makes the great mine.
6. There is no occupation in which it is easier to waste money by inexperience, carelessness, or folly.
7. No business has greater need of the presence and constant attention of an economical, attentive, and capable manager, directly interested in the business.
8. For persons of small means, the only safe way to work a quartz mine is to make it pay as it goes along, and to abandon it whenever the outgo exceeds the income.
9. Many of the best quartz mines in the State were rich at the surface, and have yielded more than enough from the beginning to pay for all the work expended on them.
10. Not one in five of the mines which did not pay at the surface, and has been worked to a depth of one hundred feet, has ever paid.

11. The richness of a vein at one point is no evidence of its richness at another.

12. Not one quartz miner in a thousand has made a moderate fortune.

13. Nearly all the owners of the rich quartz mines of California are capitalists, who made money in other business, and then could afford to risk considerable sums in ventures which they considered uncertain.

14. Do not build your mill till you have opened your mine, and got enough pay-rock in sight to pay for it.

15. The following remarks of Wm. Ashburner, mining engineer, are as worthy of attention as when they were written ten years since:

"In 1858, there were upwards of 280 quartz-mills in California, each one of which was supplied with quartz from one or more veins. The number of stamps in these mills was 2,610, and the total cost of the whole mill property of this nature in the State exceeded $3,000,000. In the summer of 1861, while I was attached to the Geological Survey, I made a careful and thorough examination of all the quartz-mills and mines of the State, and could only find between forty and fifty mills in successful operation, several of which were at that time leading a very precarious existence."

16. A good quartz mine, well managed, is the most profitable and satisfactory kind of property to be found in California.

§ 246. *Rich Mines.*—Among the quartz mines which have produced the largest sums, are the following: The Princeton mine, which has produced $4,000,000; the Pine Tree and Josephine, which together produced $350,000 from the 1st May, 1860, to the 1st May, 1863; and the Mariposa mine, which produced $84,948 in 1864, are in the Mariposa grant, and have all been idle most of the time since 1865. The New Britain has yielded $52,000, the Sherman $200,000, and the Hite's Cove now yields $15,000 net per month.

In Tuolumne County, the Soulsby yielded for a time $100,-

000 annually, the Platt has paid $40,000 profit, the Grizzly has produced $125,000, the Excelsior $300,000, the Sell & Martin $150,000, the Tennessee $60,000, the Austrian $100,000, and the Sophia $45,000.

The Morgan mine, on Carson Hill, in Calaveras County, (according to the statement of Thomas Dear, who is reputed to have better opportunities of knowing than any body else) produced $2,800,000 from February, 1850, to December, 1851. Mr. Stevenot, however, who claimed an interest in the mine, though he did not succeed in the courts, says the sum was $1,500,000. At any rate, immense masses of gold were found, and the town of Melones, at the foot of the hill, was the largest mining camp in the State for a time. The South Carolina has yielded $400,000, the Reserve $100,000, the Bovee $600,000, Hill's Mine $250,000, and the Cherokee $100,000.

The Hayward mine, in Amador County, has been reported to be the most profitable mine in the State. About 24,000 tons are crushed in a year, and there are 120,000 tons in sight. The present supply of ore is obtained 1,200 feet below the surface, and 300 feet below the level of the sea. The Keystone, a mile and a half distant, pays $80,000 a year in dividends. The Oneida, a mile and a half distant in the other direction, has produced very large sums, and has in sight 90,000 tons of rock, expected to yield about $17 per ton. The total expense is about $5 per ton. The Seaton mine has yielded $100,000.

In El Dorado County, the richest mines have been the Pacific, which has yielded $500,000, the Woodside, which yielded $12,000 in specimens, the Danes, and the Shepard.

In Placer County, the St. Patrick is the most notable.

In Nevada County, the Eureka has yielded $3,000,000; the North Star $500,000 profit; the Allison $2,300,000; Massachusetts Hill $5,600,000; New York Hill $500,000; Missouri Hill $200,000; the Fellows $1,000,000; Norambagua $80,000; Gold Hill $4,000,000; Union Hill $74,000; Empire $1,300,-

000; Hueston Hill $1,000,000; Osborne Hill $1,000,000; Lone Jack $500,000; Gold Tunnel $1,000,000; Nevada $400,000; Sneath & Clay $300,000; Lecompton $250,000; Wigham $200,000; the Banner $200,000; and the Idaho several millions, now yielding $4,000 daily.

In Sierra County, the Sierra Buttes mine has paid more regularly than any other in the State, having been worked steadily for more than twenty years, and having yielded about $2,500,000, including more than $1,000,000 profit. The Independence, on the same vein, yielded $100,000 in 1866. The Primrose, two miles distant, has yielded $226,000—idle. The Union, one mile from Alleghany, yielded $75,000 in a pocket.

In Plumas County, the Eureka has yielded $1,600,000; the Mammoth, $1,000,000; the Crescent, $500,000; and the Whitney, $68,000.

In Yuba County, at Brown's Valley, twelve miles from Marysville, and not more than 500 feet above the level of the sea, are the Pennsylvania, which yielded at one time $10,000 net per month; the Jefferson, which has paid $250,000 of dividends; and the Dannebroge, which has yielded $250,000.

§ 247. *Extraction.*—The extraction of auriferous quartz after it has been found, does not differ in any important material from the extraction of other ores in narrow veins. The rules for running tunnels and drifts for stoping, draining, ventilating, and timbering, are precisely the same. Extraction, however, requires much experience and judgment for proper management. The dip, thickness, and material of the vein, the horizontal length and the dip of the pay-chute, the character of the walls, the supply of water, and the situation of the mill, must be taken into consideration. Access must be had to the lower works by a horizontal tunnel, or vertical shaft, or an incline running down on the dip of the lode. There are, however, very few auriferous quartz mines in which the lower works can be reached profitably by a tunnel. Ordinarily an incline is preferred; it goes down in the vein-stone, which sometimes, but rarely, pays for the work of taking it out. After the shaft or incline is down, levels or drifts are run off horizontally as far as the pay-rock extends, at intervals usually of a hundred feet, and the levels are numbered from the surface; so when we read that they have found good rock in a certain mine at the eighth level, we presume that it is eight hundred feet below the surface. The rock between two levels is broken down or stoped out, and it falls to the drift or level below, where it is loaded in a car and hauled to the shaft, in which it is carried up.

§ 248. *Pulverization.*—Nearly all the quartz of California is crushed by stamps or iron hammers, ten inches in diameter, and weighing 500 pounds. The stamp is fastened to a vertical iron stem about six feet long, and near the top is a projection by which a cam or a revolving shaft lifts the stamp a foot high and then lets it fall. Five stamps are placed side by side in a battery, and they fall successively, each making about 40 blows in a minute. The quartz is shoveled in on the upper side, and when pulverized sufficiently, it is carried away through a wire screen on the lower side by a stream of water, which pours into the battery steadily.

§ 249 *Arrastra.*—The arrastra is the simplest instrument for grinding auriferous quartz. It is a circular bed of stone, from eight to twenty feet in diameter, on which the quartz is ground by a large stone dragged round and round by horse or mule power. There are two kinds of arrastras, the rude and improved. The rude arrastra is made with a pavement of unhewn flat stones, which are usually laid down in clay. The pavement of the improved arrastra is made of hewn stone, cut very accurately and laid down in cement. In the center of the bed of the arrastra is an upright post which turns on a pivot, and running through the post is a horizontal bar, projecting on each side to the outer edge of the pavement. On each arm of this bar is attached by a chain a large flat stone or muller, weighing from three hundred to five hundred pounds. It is so hung that the forward end is about an inch above the bed, and the hind end drags on the bed and crushes the quartz.

§ 250. *Amalgamation.*—The pulverized auriferous quartz, as it comes from the stamps, consists of fine particles of rock and gold mixed together, and the objects of the miner are to separate them, save the metal, and let the other material escape. Here again a small sluice, similar in principle to that used in placer mining, is used; but instead of riffle-bars, the bottom of the sluice is copper, covered with quicksilver, or is a rough blanket, in which the gold and heaviest sands are caught. In many mills quicksilver is placed in the battery, two ounces of quicksilver for one of gold; and about two-thirds of the gold is caught thus. Next the battery is the apron, a copper plate covered with quicksilver, on which a good share of the gold is caught.

§ 251. *Concentration.*—Below the aprons different devices for catching the gold are used in different mills. The blanket is the most common. It is a coarse blanket, laid at the bottom of a sluice through which the pulp from the battery runs, and the gold, black sand, and sulphurets are caught in the wool, while the lighter material runs off. The blanket is washed out in a tub at intervals of half an hour or an hour.

In some mines nearly half of the gold is mixed with pyrites, and refuses to be caught by quicksilver. In such case a sluice may be used to separate the sulphurets, which may form three per cent. of the pulverized rock. This separation is called concentration, and the material obtained is concentrated tailings. The sulphurets are five times as heavy as water, and twice as heavy as quartz, so the separation is not difficult when the supply of water is abundant.

§ 252. *Chlorination.*—In roasting for chlorination we have, first, to oxydize the iron, and next, by introduction of salt, to chloridize certain other substances which vary with the locality from which the ore is obtained. When this is rightly done we have usually formed either oxydes or oxychlorides of all the base metals in the ore treated, leaving gold as the only free metal to absorb the chlorine gas. In order to be successful in roasting the ore, attention must be given to the construction of the furnace. If the arch over the hearth is too high, the ore will not be oxydized; so also if the flues are too large, or the damper is opened too wide, as the excess of cold air or draft cools the ore. Then again, if the arch is too low, or flues too small, the air will fail to yield its oxygen to desulphurize and oxydize the ore. Cold air must always flow into the furnace through the work-holes, but it must be in proper quantities—and the work-holes must be in proportion to the chimney-flues. The main principle of chlorination is, that the metallic gold is dissolved by chlorine gas, while metallic oxydes are left untouched. The ore is first roasted in a furnace of proper construction, and then enclosed in a covered vat, into which chlorine gas is introduced, until all the gold is converted into chloride of gold; and then the vat is opened and filled with water, which dissolves the gold as sugar is dissolved under similar circumstances. The solution is drawn off, and the metallic gold precipitated from it by the introduction of the protosulphate of iron. The cost of the entire process does not exceed $20 per ton; and in some locations, where wood is cheap and freights moderate, it may be worked as low as $12 per ton of sulphurets. The roasting is the most difficult step in the entire process, but every part must be correctly performed.

§ 253. *Quicksilver.*—The productive quicksilver mines of California are all in the Coast Mountains, between latitudes 36° and 39°. There are three main groups: those of Santa Clara County, including the New Almaden, which produces 11,000 flasks annually; those of Fresno, including the New Idria, which yields about 6,000; and those of Napa, including the Redington, producing 7,000. The yield is irregular in all the districts and all the mines, the ore being found in masses almost disconnected; so that the working of a good body of cinnabar in one year may be followed by several years of searching for others like it. The total production of the State has never exceeded 52,000 flasks in a year, and at present may be estimated at little more than half that amount.

The New Almaden is the great mine of the State, and has produced in the last twenty-four years about 600,000 flasks, or 45,000,000 pounds of metal. The highest production was in 1864, when it reached 43,000 flasks. It is situated fifteen miles southward from San José. The New Idria mine is on the eastern slope of the Diablo ridge, seventy-five miles southeastward from Hollister; the Redington mine, twenty-eight miles east of Calistoga; the Phœnix and Washington, in Pope Valley, ten miles east of Calistoga; the Oakville, six miles southward from the town of St. Helena; and the St. Johns, five miles northeastward from Vallejo. The St. Johns and the Great Western, eighteen miles beyond Calistoga, are mines that promise to become important in the future. The total present production of the State is about 30,000 flasks. The consumption of the Pacific States and Territories is 19,000, and of the remainder of the continent, 11,000, so that North America has no need either to export or import now.

The metal is extracted from the ore by sublimation. The furnaces and condensers used differ greatly in the manner of construction, and also in the expense of running.

At the New Almaden and New Idria mines the old style of furnaces are used. They are about fifty feet long, twelve feet high, and twelve feet wide. At one end of each furnace is the fire chamber, which may be nine feet cubic inside; next that is the ore chamber, of about the same size; and beyond that is the condensing chamber, in which there are a number of partitions, alternately running up from the bottom and down from the top, with a space for the fumes to pass, their course being up and down, and up and down again, and so on for a distance of thirty feet to the chimney, which is forty feet high. In the bottom of the condensing chamber is water. The walls between the fire chamber and the ore chamber, and between the latter and the condensing chamber, are built with open spaces, so that the heat, smoke, and fumes can pass through. The ore is placed in the ore chamber in such a manner as to leave many open spaces. The heat drives off the sulphur and mercury of the ore in fumes, which in passing through the condensing chambers deposit the mercury, and the smoke and sulphur escape through the chimney. Three days are usually allowed for drawing off the metal from each charge, and then several days are allowed for the furnace to cool off before the exhausted rock can be removed, and a new charge put in, so that nearly a week is devoted to a charge. The rock must be made white hot before the quicksilver passes off in fumes.

The furnace patented by Knox and Osborn may be considered the favorite, more of that than of any other kind being in use. It is upright in form, about twenty feet high, receives the ore at the top, and the heat from a hearth at the side. It has a capacity of twenty-five tons, and eighteen tons are roasted daily, implying that the ore remains four days in the heat. At the end of six months the fire is allowed to burn out, and the furnace is examined to see whether repairs are necessary. Two cords and a half of wood are required daily. The condensers are of cast iron, seven feet long, four feet high, and two feet wide, the inner end being fourteen inches higher than the outer, to allow the soot to come down easily to the door. Sixteen of these are required for condensing the metal from eighteen tons of ore (averaging less than five per cent. of metal) daily. They are all connected into one continuous channel by goose-neck castings, and each with its gooseneck weighs 2,700 pounds. Water trickles continuously over all the condensers to keep them cool. By this furnace, and perhaps by several others, ore yielding one-half of one per cent. of metal, can be worked with a profit at the present prices.

§ 254. *Silver.*—Silver ores are found at many places in California, but the only productive silver mines are east of the main divide of the Sierra Nevada. There are five silver mills in Alpine, four in Mono, and eight in Inyo County, but most of them are idle, and not one of them is producing much. In the production of silver by the milling process the ore, after it has been pulverized by stamps, is stirred as a thick pulp in a large iron pan with water, quicksilver, and some chemicals for six hours, at the end of which time the pulp is run into a tank, mixed with much water, and allowed to settle, when the amalgam and quicksilver are found at the bottom.

The cost of extraction usually ranges from $2 to $6; crushing costs from $9 to $12, amalgamation from $1.50 to $2.50, and other expenses may be from $2 to $10 when there is a good supply of ore. But allowance must be made for prospecting, dead work, and other contingencies which beset every silver mine, and the cost of which is without limit. Free-milling ore will not, as a general rule, pay a profit unless it yields $22 per ton, and few companies can make dividends at that figure.

The most productive silver mines of California are those at Cerro Gordo, in Inyo County, where the ores are of the smelting class, containing considerable proportions of carbonate and sulphuret of lead. These mines are nearly 7,000 feet above the sea. In some of the lodes the lead and silver are mixed, containing sixty per cent. of the former and $60 of the latter to the ton; in others, either the quantity of one or the other is very small, and the ores have to be mixed. The pay-ore yields fifteen to thirty per cent. of argentiferous lead or base bullion, containing from $200 to $400 per ton of silver and gold. The ore is smelted at the mine in furnaces, each of which produces from three to ten tons of bullion daily. The base bullion is shipped to the refining works, San Francisco, where it is melted at a heat so low that the silver crystallizes in the liquid lead, and can be dipped or strained out by the Pattinson process. The expense of refining varies from $30 to $80 per ton.

§ 255. *Sulphur.*—Sulphur is produced at the sulphur bank, on the eastern shore of Clear Lake, about eight miles from the town of Lower Lake. The mineral is found in a proportion varying from ten to forty per cent. with earth. The crude material is shoveled up from the surface; taken in a wheel-barrow to a furnace, where it is heated, and the sulphur passes off into an iron receiver; thence it goes into an iron pot where it is purified, and is allowed to run in a fluid form into a wooden box, in which it solidifies. It is then ready for the the market.

§ 256. *Borax.*—Borax, and minerals from which borax can be made, are abundant in certain lakes and dry lake beds east of the Sierra Nevada, extending from Reno to near the Colorado River. The extraction of borax from these deposits is a new business, and has not yet been placed on a very economical basis. The chief difficulty at present is expensive transportation; but it is beset by many other drawbacks. The crystals of borate of lime found mixed with sulphate of soda, chloride of soda, other salts and dirt, in the dry-beds of ponds east of the Sierra Nevada, are dissolved in hot water, which, after it has stood several hours, is drawn off, leaving the sand and clay behind it, and then soda is added to form a biborate, which is crystallized after the lime has been precipitated in an insoluble condition. In some places carbonates of soda are found, and the production of sal-soda and caustic soda will become important in time. Some soda was made in 1864 and 1865 at Borax Lake, near Clear Lake, but the business was interrupted by the abundant rains in 1866 and '67, and has not been resumed.

§ 257. *Hydraulic Cement.*—The production of hydraulic cement in California is confined to one mill at Benicia, but might, perhaps, be extended. The peculiar limestone converted into the cement by burning and grinding, is found in seams not more than five feet wide, in the metamorphic sandstone on both sides of the Strait of Carquinez, and the workmen seldom dig down more than ten feet for it. The largest deposit of it now known is about half a mile southward from the railroad wharf at Vallejo, and teams are constantly employed hauling the rock from that point to the mill. The company pays fifty cents for the privilege of digging up the rock on land within four or five miles of its mill, and pays from $3 to $5 per ton for rock, (according to quality) delivered at the mill. About 1,500 barrels of the cement are shipped per month, and the quality is reported to be superior to the best imported. Considerable quantities of the rock are found at distances of ten or fifteen miles from Benicia, but not enough in any one spot to justify the erection of a mill.

§ 258. *Coal.*—The total annual consumption of mineral coal in California is 500,000 tons, of which 175,000 tons come from Mt. Diablo, 75,000 tons from the coast north of our State, 5,000 from Chile, 30,000 from the Eastern States, 30,000 from England, 115,000 from Australia, and 60,000 tons from the Rocky Mountains. The supplies from Chile, Australia, England, and the Atlantic States, are irregular, depending to a considerable extent on the freights. The production of the Mt. Diablo mines is increasing, having been 6,000 tons in 1861, 50,000 in 1864, 100,000 in 1867, 150,000 in 1869, and 175,000 in 1872. The method of mining for coal does not differ materially from those pursued elsewhere, except that our seams are smaller, and good qualities of the fuel are not found until a depth of several hundred feet is reached.

CHAPTER X.

GEOLOGY.

§ 259. *Plutonic and Secondary.*—The rocks of California are mainly Plutonic, upper Secondary, Tertiary, and Volcanic. The Plutonic, or granite, forms the bulk of the Sierra Nevada and part of the coast mountains. The upper Secondary occupies a belt on the western slope of the Sierra Nevada, varying from five miles in width, about latitude 35°, to forty miles in latitude 39°. Its lower edge is in places within five hundred feet of the level of the sea; its upper line 6,000 feet, but the average elevations of the two edges are probably 1,000 and 4,000 feet. The rocks of this formation are mainly slates, and in them are found the seams of auriferous quartz and the deposits of gold-bearing gravel which first attracted a large population to California. These slates are found, also, in the northern coast mountains; and in the Sierra Nevada a belt of limestone is associated with them. In the coast mountains, south of 39°, and also in spots on the Sierra, cretaceous rock, the highest of the secondary formation, appears, and it is accompanied by coal and quicksilver.

§ 260. *Tertiary.*—The Tertiary formation, stratified and metamorphic sandstones, occupy the valleys in the middle and southern portions of the State, the greater part of the coast mountains, and the lower foothills at the back of the Sierra Nevada. The strata on the coast mountains have been much disturbed, and we frequently find them standing nearly vertically. In the vicinity of San Francisco, the cuts through the hills show great and numerous flexures. The aqueous sandstone of California is generally unfit for either building or road making. The stratification is thin; it abounds in fractures, does not wear well when exposed to the weather, and under wheels is soon converted into mud. Some of it that has been highly metamorphosed by heat, is excellent for building.

§ 261. *Volcanic.*—Volcanic rocks occupy a large space north of latitude 38°. In remote ages, California was the scene of great volcanic activity in the northern half. No lavas or volcanic peaks west of the summit of the Sierra Nevada have been found south of the latitude of the Golden Gate on 37° 48′, while on the other side of that line they are abundant. Mount Diablo has the conical shape and solitary position of a volcano, but its rocks are cretaceous. The numerous high peaks of the Californian Alps—the principal one reaching the greatest elevation in the United States—much as some of them resemble volcanic cones at a distance, fail to show any signs of volcanic action so far as they have been closely examined.

Many of the lava beds of the Sierra Nevada are prominent features of the landscape. They filled up the channels and cañons of the streams of the Pliocene or post-Pliocene age, and being harder than the slates, the latter were washed away, leaving those places which had been hollows standing like steep mountains, rising 500 or 1,000 feet above the adjacent country. The Tuolumne Table Mountain, 30 miles long and half a mile wide, and the Oroville Table Mountain, nearly as long, are the most remarkable examples of such geological changes; but many others might be found. Ridges covered with beds of lava are common.

There are immense beds of lava about Mount Shasta, and appearances indicate that at least 10,000 feet of the elevation of that peak are due to the matter ejected from its crater.

Mount Lassen also vomited wonderful quantities of molten rock; and an area of nearly, if not quite, 10,000 square miles, including those two peaks, is covered with lava of various kinds, and in many places they have not been sufficiently decomposed on the surface to sustain a good growth of vegetation.

§ 262. *Extinct Volcanoes.*—The most southerly volcanic peak yet discovered on the Coast is Mount St. Helena, in latitude 38° 42′, 4,343 feet high. Its volcanic origin is indubitable, although its long and flat form does not suggest the volcanic idea to the spectator looking from a distance. The basaltic columns forming a projecting point at its northern end, and another, but less prominent one, near its southern end, and the basalt covering the ridge to the southward, must have come from this crater, which was once half a mile in diameter, but has been worn down by the eroding action of water, so that its original outline is scarcely traceable. The ridge between Sonoma and Petaluma is covered with trap; that between Napa and Sonoma has an immense quantity of tufa and a little trap, and that east of Green Valley in Sonoma County has much tufa; and presumptions indicate that all these may have poured out from St. Helena. The country, however, for fifty miles north-northwestward from St. Helena, is full of the evidences of great volcanic activity. Clear Lake, which is twenty miles long, seems to have been the crater of a [illegible], and the Californian geysers are solfataric in their character, and undoubtedly derive their heat from the deep internal fires.

§ 263. *Gold-bearing Rocks.*—The gold-bearing formation of California is a jurassic slate, in which are found veins of auriferous quartz, and these occasionally extend into adjacent granite and limestone. The erosion or disintegration of the rock has set free much gold, which is now found in the placers or gravel beds.

The quartz lodes vary in thickness from a line to forty feet, and they run in every direction; but usually their course coincides with that of the mountain chain in which they are found. The most remarkable vein of the State, and perhaps of the world—in extent, at least—is the Mother Lode of the Sierra Nevada. It has been traced for sixty miles, from the Cosumnes River to Mariposa, in a southeast direction, with a dip of about 45° to the northeast. The width varies greatly, but the average may be thirty feet. The vein stone is a white quartz, divided up into a multitude of seams, with gray and brown discolorations, and with small proportions of iron, copper, lead, antimony, and silver ores, besides gold, in the state not of ore, but of metal. The Mother Lode is not only the main support of a number of mining camps, but it also affects the face of nature; for such prominent elevations as Peñon Blanco, Quartz Mountain, Carson Hill, and Whisky Hill, seem to be due entirely to the superior hardness of the large body of quartz in this vein, which has defied the eroding powers, while the softer slates adjacent have been washed away. The hills stand in those places where the lode is widest and most compact, and the rivers have sought out the intervening points where the quartz was divided up into a multitude of little seams, as at the crossings of the Mokelumne, Stanislaus, Tuolumne, and Merced Rivers, and Maxwell's Creek.

§ 264. *Placers.*—The placers are alluvium that contains gold. As the auriferous rocks were worn away, the lighter and smaller particles were swept down into the level valleys, while the larger pieces of stone and the materials of greater specific gravity were left near the point where they were set free. If a stream cut through a vein of auriferous quartz, containing thick seams of gold, the largest lumps of the metal would be near the point of intersection, the smaller lumps would be carried down farther, and the fine scales might be deposited many miles below. The smaller the pieces of gold, as a general rule, the smoother they are, the smaller and smoother the sand or gravel in which they are found, and the nearer the bottom land of the valleys. Gold is rarely found in loam or pure clay, but usually in the strata of gravel or boulders, next the bed-rock, and in the deepest depressions, as in the beds of streams.

§ 265. *Dead Rivers.*—But those places which are now, were not in the Pliocene era, the beds of rivers. California has numerous dead rivers or channels, once used by large streams of water, but now filled up with gravel; and on account of their auriferous wealth they have been discovered, traced out, and examined with an industry and care not bestowed upon similar extinct streams in any other part of the world. Indeed, it is doubtful whether dead rivers so wonderful in character could be found elsewhere. Some of these channels are covered with mountains of basalt, among which the Tuolumne Table Mountain, thirty miles long and half a mile wide, is the most celebrated. In the Pliocene age, a river ran nearly in the course of the present Stanislaus, but it was destroyed by a lava flow, which left no place for the water, rose to the level of the banks, and after they were washed away by the water, rose up like a mountain, with a serpentine course, steep sides, and a bare and level top. In sinking down through the middle of Table Mountain, the miner passes through 150 feet of basalt, 100 of volcanic sand, 50 of clay and sand, 30 of gravel, (the lowest 10 feet being rich in gold) and then strikes the bed-rock of slate. When that channel was filled up, and became a dead river, the waters had to find a new course in the live Stanislaus.

§ 266. *Dead Blue River.*—The greatest dead river of California in length, breadth, depth and wealth, is "The Dead Blue River," as I call it. Some gentlemen, connected with the State Geological Survey, have denied the correctness of my assertion, that there is such a stream; and they claim that the gravel deposits which I include in it, were not made in a river-bed: but I adhere to my opinion. A line of placer mining towns extends from Forest Hill, on the southern line of Placer

County, to the northern line of Sierra, a distance of 65 miles in a north-northwest direction, intersected by the live streams, some of which run in cañons 2,000 feet deep. These towns are situated at the points where the auriferous deposits of the Dead Blue River are accessible. The gravel is uniform in its character, and rich wherever the lower strata have been reached. The name was suggested by the general bluish color of the sand mixed with the pebbles and boulders, most of which are of quartz. The term "gravel" is applied to the material found in these dead rivers, though in it we often find boulders a foot, or three feet, or six feet through. The lower the strata, as a general rule, the larger, rougher, or less regular the pieces of stone.

The abundance of quartz in the Dead River is astonishing and inexplicable. In the large live streams running through the quartz districts we find perhaps one per cent. or one-fifth of one per cent. of the gravel and boulders composed of quartz, and we know that in the rock eroded by the live streams running down the Sierra Nevada, quartz does not form one-twentieth of one per cent. But in the Dead Blue River, we find that fifty or seventy per cent of the gravel is quartz. And its absolute quantity is not less wonderful than the proportion. The Dead Blue River contains a hundred fold more quartz in its pebbles and boulders than we could get from all the known quartz veins of the Sierra Nevada, if we should dig them out through their entire length to the depth of a mile.

This Pliocene river was a quarter of a mile wide on an average, was parallel with the Sacramento, but fifty miles farther east, and carried ten or twenty times as much water. The current ran southwards, as that of the Sacramento does. We know this fact from the present elevations, from the manner in which the flat boulders lie pointing down stream, from the direction in which the branches—which, like the main stream, are filled with gravel—enter it, from water-worn pieces of driftwood, and from drift trees with the tops pointing down stream. We find such marks in live streams, and they cannot be attributed in the Dead Blue, as it is sometimes called, to any influence save that of a strong current flowing southward.

It was a stream of wonderful force, far exceeding in power any of its size now known. The miners find strata of boulders, many of which weigh a ton, deposited over a width of a quarter of a mile, and a length of sixty miles; above that is another stratum of boulders, in which half a ton is a common weight, and so on, until ten feet above the bed-rock we find boulders a foot through. We do not know, nor are we justified in supposing, that the Columbia or the Mississippi could distribute such boulders with such regularity. The entire depth of the gravel is from 200 to 400 feet deep, averaging 300.

The bed of the Dead Blue, at Forest Hill, is 2,700 feet, and at Little Grizzly, the most northern point to which it has been distinctly traced, 4,700 feet high—a descent of 2,000 feet in 65 miles, or 37 feet in a mile. A fall of five feet in a mile makes a swift river; with one foot in a mile a canal eats away its banks. The country in which the Dead Blue runs has been raised by subterranean forces, or contractions of the earth's crust, and the upper end may have been elevated more than the lower; though the Sierra Nevada down to 36° has been raised more than that to the northward.

North of Sierra County, the Dead Blue River is covered with lava, or otherwise hidden, while south of Placer, it has been washed away or covered with later alluvium.

The dead rivers are much richer in gold than the live ones. They were larger; they eroded greater masses of rock, and had access to larger bodies of quartz, probably auriferous. The streams of the present day have cut down through those of the Pliocene era, and are invariably much richer below the intersection than above.

In the Dead Blue River most of the gravel, about 100 feet above the bed-rock, is in pieces as large as a goose egg, whereas in the Dead Brandy River, as I call it, running through Laporte, Brandy City, Camptonville, and North San Juan, the gravel is generally the size of a pigeon's egg.

§ 267. *Fineness of Gold.*—Gold is found in many parts of the State, but the principal mines are on the western slope of the Sierra Nevada. Miners look for it wherever they find granite, slate, and quartz together. It is mixed mechanically, not chemically, with the rock and base metals that accompany it; but is not pure, for it is alloyed naturally with silver, and sometimes with small proportions of copper, lead, and iron. Usually about 12 per cent. of the weight of gold dust as sold by the miners is silver, base metal, or adherent dirt; leaving 88 per cent. as the pure gold. The variations are great, however, and persons who buy gold dust as a business, study the ratio of impurity in the metal produced by the different mines. This ratio is expressed in thousandths. Thus, we say that perfectly fine gold is 1,000 fine; American coin of standard fineness is 900 fine, containing in 1,000 parts 100 of copper to harden it; the gold of Downieville ranges from 895 to 925; that of North San Juan from 960 to 965; that of Grass Valley from 800 to 840; that of Volcano, 870; Murphy's, 885; Mariposa, 700 to 820; and Kern River, 630. There are often great variations in value between the gold found in two claims separated by a distance of not more than half a mile.

Placer gold is classified according to the size and form of the placer in which it is found. Some pieces are small, others large, smooth, or rough, in flat scales, round lumps, and shaped like wires, cucumber seed, beans, pumpkin seeds, or moccasins. I have washed out gold, nearly every piece of which bore a remarkable resemblance to cucumber seed in form and size. These peculiarities, however, are much less important now than they were formerly, when the placer mines were in the bloom of their production. Large nuggets of gold are seldom found in Calfornia of late years, but from 1849 to 1853 it was a common event to find pieces of five or ten pounds. The largest nugget on record was found at Ballarat, Australia, in 1855, and weighed 224 pounds Troy; and in 1854, a piece of gold containing some quartz, and weighing 195 pounds Troy, was found in Calaveras County, California.

§ 268. *Silver.*—Extensive deposits of silver ore occur east of the Sierra Nevada, in the basins of Owen Lake and the Mojave and Colorado Rivers; but the only silver mines of note in the State are those of argentiferous galena at Cerro Gordo.

§ 269. *Quicksilver.*—Quicksilver is one of the leading metals of California in industrial value, its total yield surpassing that of silver obtained from the argentiferous lead added to that separated from gold. Mercury occurs in its metallic form in some porous rocks near St. Helena, from which it can be shaken out; but the market is supplied by mines of sulphuret or cinnabar, the richest deposits of which are at New Almaden, New Idria, Knoxville, Pope Valley, Vallejo, and various places in Sonoma County. Cinnabar is found at many points in the cretaceous rocks of the Coast Range, from Santa Barbara to Shasta.

§ 270.—*Platina.*—Platina, iridium, and osmium, are three white metals resembling steel, often found in the placer mines of California. They usually occur together, and are found more abundantly in the lower part of the Klamath Valley than in any other part of the State. In many districts they are entirely lacking. Platina is found in lumps by itself; iridium and osmium are found united, and are then called irid-osmium. These metals are found in small particles, usually fine scales; the largest piece was of irid-osmium, found on the Lower Klamath, and weighed an ounce and a quarter. They are not found separate from the gold, nor are they ever the main object of search; they are obtained in small quantities only, and are rarely bought and sold in the State; they have no fixed market price. When mixed with gold dust, they injure its value, and prevent its reception at the mint on deposit.

§ 271. *Other Metals.*—Copper ores are abundant in the Colorado desert, but are of little value there, on account of the high cost of reduction and transportation. Large deposits of copper pyrites have been found in Calaveras, Fresno, El Dorado, Amador, and Plumas Counties.

Iron, in rich beds of hematite, magnetic, and other valuable ores, exists in Calaveras, El Dorado, Sierra, and Plumas Counties.

A vein of brown oxide of tin, containing 20 per cent. of metal, and ten feet wide, has been opened at Temascal, San Bernardino County; but the extraction of it is not considered profitable, so nothing is done with it, or with other similar veins in the same county.

§ 272. *Limestone.*—A remarkable belt of limestone runs along the side of the Sierra Nevada, from the Bower Cave in Mariposa County, to Oroville, a distance of 160 miles. Though only a few hundred feet in thickness, it happens to include a number of the richest placer mining camps in the State. Among these are Columbia, Springfield, Kincaid's Flat, Murphy's, Volcano, and Indian Diggings. The limestone is a coarse marble in general character, and where crossed by streams, has been gullied out by numerous channels, leaving pinnacles of rock with open spaces between them. These spaces were filled with auriferous gravel, and were singularly rich in gold. At a few points the marble is hard and susceptible of a good polish. Metamorphic limestone exists at many points in the coast mountains, the principal quarries being in Santa Cruz and Contra Costa Counties.

§ 273. *Coal.*—The old red sandstone and the "true carboniferous" rocks, as they are called, are wanting in California, and it was long supposed that no valuable coal would ever be discovered in the State; but some veins of a very good quality have been found near Mount Diablo. The mineral contains far more solid combustible matter, and less incombustible material, than most tertiary coal. In the strict geological meaning of the terms, it is not "coal," but "lignite," belonging to a later date than the true coal, and lying in a different formation. The rocks are sandstone and shale, of the cretaceous or upper secondary age, and were formed by alternating depositions in salt and fresh water. The coal veins are situated on the northeastern slope of Mount Diablo, are from two to nine feet in thickness, dip to the north at an average of 30°, and open on the southern declivities of the hills. A chemical analysis of some of the best specimens showed 50 per cent. of carbon, 46 per cent. of volatile bituminous substances, and 4 per cent. of ashes. The coal is bituminous in character, breaks readily, shows a bright surface where fractured, and burns with a brilliant flame. The quantity is large, and it can be profitably supplied in San Francisco at eight dollars per ton, whereas imported coal has hitherto cost twice as much.

§ 274. *Asphaltum.*—Bituminous springs are numerous near the coast, from the northern line of Monterey County to San Diego. They throw up a dark, pitch-like fluid, of a strong odor, which, on exposure to the air, grows thick, and finally solid. It collects in great masses about the springs, and in some places covers several acres of ground. After being exposed to the air for some time, it is called "asphaltum," which is very hard in cold weather, but grows soft at about 75°, and becomes liquid at 85°. Some springs of it rise in the sea near San Diego, and others near Santa Barbara; and masses of the asphaltum are seen floating many miles from shore. The air at sea is even scented with it, and on several occasions frights on shipboard have been caused by its odor, which was supposed to come from some hidden fire.

The principal places in which these springs of asphaltum are found, are the following:

1. In the Santa Cruz Mountains, in the southeastern part of Santa Clara County. A tract of twenty-five acres is here covered by the hardened asphaltum.

2. In San Luis Obispo Valley. The asphaltum covers thirty acres.

3. The Napoma ranch, in San Luis Obispo County. The springs are small, and yield but little.

4. On the ranch of La Purissima, in Santa Barbara County.

5. A place six miles west of the town of Santa Barbara. The deposit of asphaltum covers three hundred acres, from two to eight feet thick.

6. Rincon, of San Buenaventura, Santa Barbara County.

7. A place near the San Buenaventura River, twelve miles from its mouth, in Santa Barbara County.

8. A place near the Santa Clara River, eighteen miles from its mouth, in Santa Barbara County.

9. A place in the Sierra Santa Susanna, in Los Angeles County.

10. In Los Angeles Valley, Los Angeles County.

11. The San Pedro Hills, in Los Angeles County.

12. San Juan Capistrano, Los Angeles County.

One of the deposits in Santa Barbara is so near the sea, that the mineral might be thrown with a shovel into a chute which would carry it into the hold of a vessel at anchor.

The asphaltum generally comes up through sandstone. The springs of Santa Barbara seem to have ceased to flow, while those in Los Angeles County are still active. It is supposed that the amount lying on the surface at the various deposits is not less than five thousand tons.

§ 275. *Miscellaneous Minerals.*—Sulphur occurs at the sulphur bank near Clear Lake, at the Geysers, near San Buenaventura, in San Diego County, thirty miles northward from the bay, and in Colusa County. At the sulphur bank the mineral is mixed with earth, sand, and soda. Sulphur springs abound in the Coast Range; and in the volcanic districts about Clear Lake, the Geysers, Mt. Shasta, and Mt. Lassen, there are numerous vents for sulphurous fumes, which deposit their sulphur on the sides of the holes through which they rise to the surface.

Gypsum is found at numerous points in the coast mountains, but not in large bodies; and the name of the Alabaster Cave, in El Dorado County, indicates the material of its sides.

Clay, valuable for stoneware and fine brick, is obtained at Michigan Bar, and near Antioch.

There are alum springs at the Geysers and near Owen Lake, and banks of clay containing a strong taste of alum have been noted in Santa Clara and Calaveras Counties.

Diamonds have been washed out from the placers at many points on the slopes of the Sierra Nevadas; but they have been too small and too rare to justify hunting for them as an exclusive or as a main occupation. The best place for them so far has been Cherokee, Butte County, where a deep stratum in a dead river, covered by the Oroville Table Mountain, contains them.

Opals are abundant in a stratum near Mokelumne Hill, but they are of a dull lustre and worthless quality.

Hydraulic lime, fit for cement, occurs in seams in the metamorphic sandstone, north of Mt. Diablo, and there is enough of it about Benicia to keep a mill going.

A bed of plumbago, or graphite, near Columbia, was worked in 1867, but has been abandoned as unprofitable.

Chromic iron is exported from Del Norte and Sonoma Counties, and an ore of manganese has been dug in considerable quantities in Red Rock.

Salt springs are found in Shasta County.

Deposits of borate of lime, carbonate of soda, and borate of soda, cover the dry beds of numerous ponds east of the Sierra Nevada; and some of them promise to have a high commercial value for the production of borax.

A small lake, without an outlet, east of Clear Lake, is a weak solution of borax.

Steatite, or soapstone, valuable as a substitute for fire-brick, exists in extensive layers in El Dorado County, which has also beds of silicious earth, or fine grit, valuable for polishing.

§ 276. *Water.*—The waters of California are generally soft and pure, but mineral, warm, and hot springs are numerous. Large hot springs are found in large clusters in Surprise Valley, at the eastern base of the Sierra Nevada, at the Geysers, and in the vicinity of Clear Lake. They are also found scattered through the coast mountains, nearly every valley having several. Most of the hot springs are also mineral, sulphur being the predominant flavor. The temperatures of certain springs are thus given: Harbin's Springs 108° and 118° respectively, Skaggs' Springs 120° and 140°, White Sulphur Springs 97°, 79°, 75°, 76°, 64°, 68°, 89°, 86°, and 69°, San Bernardino Warm Springs 108°, 128°, 130°, 166°, 169°, and 172°, Aguas Calientes, (San Diego County) 58°, 74°, 130°, 136°, and 140°, Warner's Ranch Warm Spring 135°.

Borax Lake, in the very dry season of 1863, contained 281 grains of anhydrous biborate of soda to the gallon, besides as much carbonate of soda, and three times as much chloride of sodium.

Clear Lake contains 11.69 grains of solid matter in a gallon of water, including 3.19 of carbonate of lime, 3.35 carbonate of magnesia, 0.91 carbonate of iron, 0.32 chloride of potassium, 0.42 chloride of sodium, 0.42 sulphate of lime, 0.57 silica, traces of boracic and phosphoric acid, and 246 of organic matter. The following figures of solid grains in a gallon give the basis for a comparison of some of the waters of Pilarcitos (San Francisco) and Clear Lake with those of Lake Michigan at Chicago, and Croton River at New York.

	PILARCITOS.	CLEAR LAKE.	CHICAGO.	NEW YORK.
Organic Matter....	0.78	2.46	1.06	0.66
Inorganic Matter..	7.42	9.23	5.62	3.90
Total Solids.....	8.20	11.69	6.68	4.56

§ 277. *Artesian Wells.*—There are a great number of artesian wells in California. In Santa Clara County, within a district six miles wide by fifteen long, there are three hundred—

more than are to be found in any other district of equal size in the world. Their water is nearly all used to irrigate land; some for manufacturing purposes. They supply about two million gallons in twenty-four hours. The wells are from fifty to four hundred feet deep; the bore varies from six to nine inches. Only a small portion of Santa Clara Valley yields artesian water; the artesian district lies north of a line commencing at Mountain View; thence running nine miles with the road through the town of Santa Clara to San José; and thence southeast to the mountains. South of this line no artesian water is found.

It is supposed that the water comes from certain subterranean streams. One well has abundant water at one hundred feet; another, not more than one hundred yards distant, has no water short of three hundred feet. The wells throw up living fish and shell-fish, which are of different species in different wells. Some wells throw up soft-shell clams, good to eat, and of a kind not found in the superterrene waters of the State, before the opening of these artesian supplies. One well throws up a snail, with a long spiral shell; another has snails with flat shells; and others have blind fish, evidently of a species that has lived long in subterrene waters, and lost its eyes because it had no use for them. Like the fish of the Mammoth Cave, in Kentucky, these artesian fish have the eye-socket and a blind eye in it. The wells that produce the fish and shell-fish are mostly shallow, not more than one hundred and fifty feet deep. If put into water fresh from wells two hundred and fifty or three hundred feet deep, they soon die, as do superterrene fish; either, it is supposed, because the water is too warm, or because it has not enough air in it. The deeper the well, the warmer the water.

Many of the wells have gone dry—"been drained by other wells," as people say; but yet how can one well "drain" another, the mouths of both being on a level with each other? The wells whose mouths are at a lower level may take water from those farther up the valley; but the theory that the water deserts one well, to flow out of another of equal or higher elevation, is not sound. There is very little difference of elevation, perhaps ten feet, between San José and Alviso; and the wells near the latter place throw their water about five feet higher above the surface than do those of the former. One cause of the failure of the wells may be the filling up of the pipes. From many of them great quantities of sand, gravel, and stones half a foot in diameter, have been thrown up; and if a large stone should happen to lodge crosswise in the pipe, the other smaller stones and gravel might soon stop it up entirely, or break the force of the current so that the water could not rise to the top. In many cases the pipe has not been driven down to the foundation; and the water, whirling round at the bottom of the pipe, has torn away the earth and made an excavation, thus preparing the way for a caving in of the ground, and filling up of the well.

Artesian wells have also been sunk in San Francisco, Oakland, Petaluma, Stockton, Fresno County, San Felipe, in Montery County, the Colonia rancho in Ventura County, the Los Angeles plain, San Bernardino, Kern, and Tulare Counties. At San Felipe, a gaspipe with a steel point was driven down with a mallet, until it reached a stratum of artesian water, which now flows up in a constant stream. Some of the San Francisco artesian wells raise their water nearly to the surface, and it must be pumped up for use. At San Diego an immense supply of water has been reached by an artesian auger, but does not come quite to the surface. San Bernardino County has 100 artesian wells.

§ 278. *Palæontology.*—It is a general rule, that the animals of former geological eras, in any given district, appear to have been the gigantic ancestors of those of the present time. Thus, the kangaroo and emu of Australia, found in no other part of the world, were preceded by gigantic kangaroos and emus, whose fossil remains are found in New Holland only. So, too, South America, in antediluvian times, had gigantic sloths and tapirs, akin to the animals now found within her limits. Each continent has a fauna of its own, to which its antediluvian animals were nearly akin. Every continent has several zoölogical districts; and the ancient and modern fauna of these districts are sometimes as clearly related to each other, and as distinctly separate from those of other parts of the continent, as are the fauna of different continents from each other. But the antediluvian animals of California possessed no peculiar relationship to the animals now indigenous to the State: the former fauna was totally distinct from that of the present age; the fossil bones found are not numerous, and no large and valuable skeletons have been brought to light, but many fragments. None of the large saurians—those wonderful lizards, as large as whales of an early geological era—have yet been found here; but our hills and mountains contain the bones of the mastodon, elephant, rhinoceros, hippopotamus, horse, camel, whale, and a quadruped resembling a tapir. Oyster-shells fifteen inches long are found near Corral Hollow, and Oyster Peak near Mt. Diablo is named after its fossils. Ammonites abound in Shasta County, some of them a foot and a half in diameter. The climate of California must have been tropical in the era ? of this extinct fauna; and then our valleys were great swamps; and our mountains were covered with a luxuriance of vegetation that now belongs to the equatorial regions.

§ 279. *Post-Pliocene Man.*—Many evidences that man existed as early as the post-Pliocene era, have been found in California; and Amos Bowman claims that he was here in Pliocene times. Near the town of Altaville, in Calaveras County, part of the skull of a man was found in a post-Pliocene formation, under four successive strata of lava, at a depth of 131 feet from the surface, in a miner's shaft. The first stratum was of black lava, forty feet deep; then gravel, three feet; light lava, thirty feet; gravel, five feet; light lava, fifteen feet; gravel, twenty-five feet; dark-brown lava, nine feet; and gravel in which the skull was found, nine feet. Some attempts have been made to discredit this discovery; but those who have made the most careful investigation of the facts, and whose opinions are entitled to the most weight, accept it.

Amos Bowman, of the State Geological Survey, thus defines certain eras in the geological history of California:

1st. The Pliocene, or ancient eroding period, during which these deep "dead" river channels were cut into the "bed-rock."

2d. These Pliocene channels filling up with gravel—or the choking or damming period.

3d. The active volcanic period of the Sierra, when the gravels were capped with lava and volcanic ashes.

4th. The cold, or glacial period, when the mountain slopes were covered with living, moving glaciers.

5th. The modern erosive, or recent period, during which the present river channels were formed, crossing the old channels at various angles.

Dr. James Blake, of San Francisco, reported to the Academy of Sciences, in the beginning of 1873, the discovery of some artificial stone ornaments, in a Pliocene formation, near San Francisco, indicating the existence of men here in the Pliocene era.

Stone mortars, pestles, and arrow-heads, have been found, according to report, in Pliocene gravel, at Murphy's Camp, Shaw's Flat, Columbia, Springfield, Tuolumne Table Mountain, Kincaid Flat, French Bar and Cottonwood, in Siskiyou County, Spanish Flat and Soapweed, in El Dorado County.

In May, 1859, an Indian arrow-head was found, eighty feet below the surface of the earth, at Buckeye Hill, Nevada County. About the same time, another arrow-head was found three feet deep in undisturbed alluvium, near Freeman's Crossing, in the same county.

In April, 1859, the skeleton of a man was found sixteen feet deep at Tehachepe, in Los Angeles County.

In October, 1855, two stone mortars, such as were used by the Indians for grinding acorns and grass-seeds, were found near Diamond Springs, El Dorado County, at a depth of one hundred feet below the surface.

In October, 1854, the skeletons of two men were found at Rattlesnake Bar, fourteen feet below the surface, and under ancient strata, which had apparently not been disturbed from the time of their deposition.

Unfortunately, these discoveries were nearly all made by men ignorant of geology, and the evidence in many cases is not so satisfactory as it might be.

CHAPTER XI.

BOTANY.

§ 280. *Fauna and Flora.*—California has a botany and zoölogy of her own. Her indigenous plants and animals are peculiar to her soil. Her plants, her quadrupeds, her birds, and her fishes, are different from those of other countries. The Californian vulture is, next to the condor of South America, the largest bird that flies; and he might easily migrate to other parts of the continent, but he makes his home only in this State, and is certainly never seen east of the Rocky Mountains. The grizzly bear might travel almost as well, but he is found only in California and Oregon. The Californian deer is different from that of Virginia in horns, teeth, feet, color, and size. The bird known as the roadrunner or *paisano* might fly to all parts of the continent, but is found only west of the Sierra Nevada. There is *a* blue-jay here, but it differs from the bird known to the New Englanders as *the* blue-jay. The robin of New England differs from the robin of Old England, and the Californian robin differs from both. The sturgeon of the San Francisco market are not the same with those eaten in New York; and one species found in California is not found in a State so near as Oregon. Our trees are like, and yet are unlike, those of the Atlantic States and Europe. We have oak and pine, spruce, sycamore, and horse-chestnut trees, and yet they differ in many important particulars from the trees known by those names elsewhere. California, with a little of the country adjacent, is a distinct botanical district, and is more nearly related in vegetation to Spain than to the Mississippi valley. The species of trees and plants are comparatively few in number, and our forests and fields lack the variety observed in moister temperate climes. Our valleys and low hills abound with wild flowers, but nearly all bloom within a brief period instead of continuing to beautify the landscape till the end of summer. The forests are found only in the districts which have more than the average amount of rain, such as the region near the ocean, north of 36°, and the mountains. The bareness of the hills is one of the striking features of the Californian landscape.

Most of the Sacramento and San Joaquin Valleys, the Colorado Desert, the eastern slopes of the Coast Mountains, and the Coast Range south of latitude 35°, are treeless; the Sierra Nevada, and the western slopes of the Coast Range north of 35°, have fine forests; and in the foot hills of the Sierra Nevada, and in the coast valleys, there are beautiful open groves of oak-trees. The timber of the Sierra is mainly spruce, pine, and fir; that of the coast north of 37°, redwood; and spruce and pine south of that latitude.

The botany of California is remarkable for containing a number of the largest and most beautiful coniferous trees in the world, growing to a height of three hundred feet, and a thickness of eight and ten feet in the trunk, and some of them still larger. Among these gigantic glories of the vegetable kingdom, are the mammoth tree, the redwood, the sugar-pine, the red fir, the yellow fir, and the arbor-vitæ. Other large conifers contribute to the magnificence of our forests. We have the laurel, the madroña, the evergreen-oak, and the nut-pine evergreen trees, with a growth resembling that of deciduous trees. Our deciduous trees are few, and of little value to the mechanic.

§ 281. *Big Tree.*—The Big Tree of California, although not taller than some of the trees of Australia, is the largest and most wonderful production of the vegetable kingdom. It reaches a height of 300 feet, and a diameter of 35 feet, and some specimens which have fallen down, were probably still larger. From all the larger trees the tops have been broken off by the snows, so that their normal height must be not less than 350 feet. It belongs to the Linnean genus *Cupressus*, which was afterwards divided, and the new genus *Taxodium*, in which the redwood belonged, was created; but in 1850, Endlicher, a German botanist, made another division, and gave to the redwood a genus called the *Sequoia*. In this the Big Tree properly belongs. The two trees bear a remarkable resemblance to each other in the color, the texture of the wood and bark, in the color, form, development, and distribution of the foliage, and even in size, for some of the redwoods grow to be twenty feet in diameter, and 275 feet high. The specific difference of the Sequoia of the Sierra from that of the Coast Mountains, was discovered in 1853 by Lindley, a British botanist, who undertook to gratify his national vanity by creating a new genus, and naming the tree the *Wellingtonia gigantea*. The differences, however, were not generic in their character, and botanists generally repudiate his new genus, and call the tree the *Sequoia gigantea*. It is indigenous only on the western slope of the Sierra Nevada, between latitudes 36° 30′, and 38° 30′, at elevations between 3,000 and 5,000 feet above the sea; north of 37° 20′, it is found only in small and widely separated groves; south of that line it exists in belts of forest five or ten miles long. The seeds have been sent to many remote countries, and young giant sequoias are found as ornaments in many gardens of Europe, as well as in the valleys of California.

§ 282. *Redwood.*—The redwood (*Sequoia sempervirens*) is the second in size and the first in commercial value of all the trees in California, though not much superior to the sugar-pine in either respect. It is found in dense forests, in which many of the trees are five feet in diameter, 200 feet high, and 80 feet to the first limbs. The wood is dark red in color, close in texture, soft, light, straight-grained, free-splitting, and durable. It is unsurpassable for railroad ties, good for the inside finish of houses, and tolerable for such furniture as does not need to be very strong. The redwood trees have been cut down from large areas, but the roots throw up shoots which soon grow again into trees; and if carefully managed, there would be no decrease in the area covered by this valuable growth; but under neglect, other conifers are encroaching on it. In some places the roots of the redwood have been dug up, as on the hills back of Oakland; and as the foliage of the *Sequoias* not only shades the ground, but also condenses the moisture of the fogs, the land thus deprived of its protection has lost the moisture and the numerous springs found on it thirty years ago. A redwood in Santa Cruz County, known as Fremont's tree, is 275 feet high, and 19 feet in diameter, 6 feet above the ground; and many trees still larger are found between the Klamath and Russian Rivers. Near the road between Eureka and Arcata, in Humboldt County, there is a tree that measures 61 feet in circumference of trunk.

§ 283. *Pines.*—The sugar-pine (*Pinus lambertiana*) is the most magnificent tree of all the pine kind, and indeed it has no superior in the vegetable creation, save the mammoth and the redwood, the confessed monarchs of the plant kingdom. It is closely related to the white pine (*Pinus strobus*) of the Eastern States; "though," as Dr. Newberry says, "like all the conifers on the Pacific Coast, it exhibits a symmetry and perfection of figure, a healthfulness and vigor of growth, not attained by the trees of any other part of the world." The mature tree sometimes reaches a height of three hundred feet, and a diameter of twenty, but it rarely exceeds two hundred and ten. The young trees of the sugar-pine give early promise of the majesty to which they subsequently attain. They are unmistakably young giants; even when having a trunk a foot in diameter, their remote and regularly-whorled branches, like the stem covered with a smooth, grayish-green bark, showing that, although so large, the plant is still "in the milk," and has only begun its life of many centuries. The sugar-pine conspicuously exhibits one of the most general and striking characteristics of the conifers—the great development of the trunk at the expense of the branches. Nearly the whole growth is thrown into the trunk, which generally stands without a flaw or flexure, a perpendicular cone, all its transverse sections accurately circular, sparsely set with branches, which, in their insignificance, seem like the festoons of ivy wreathing about the columns of some ancient ruin. The leaves are three inches long, dark bluish-green in color and they grow in groups of five. The foliage is not dense. The cones are large, sometimes eighteen inches long by four thick. The wood is similar to that of the white pine—white, soft, homogeneous, straight-grained, clear, and free-splitting. It furnishes the best lumber in the State for the "inside work" of houses, and is the chief building material used in the Sierra Nevada, where it grows. The tree derives its name from a sweet resin which exudes from the duramen or hard wood of the tree. This resin is sugar-like in appearance, granulation, and taste, and could not be distinguished from the manna of the drug-stores, except by a slight terebinthine flavor. The pine sugar is cathartic. It is found in small quantities only, though it is said one hundred and fifty pounds of it were collected by a man who devoted himself for a few weeks to the business of gathering it.

The Western yellow pine (*Pinus ponderosa*) is a noble tree, sometimes reaching a diameter of seven feet, and is next in size among the pines of California to the sugar-pine. Its leaves grow in threes at the end of the branches, giving the foliage a peculiarly tufted appearance. The color of the leaves is a dark yellowish-green. The bark is of a light yellowish-brown or cork color, and is divided into large, smooth plates from four to eight inches wide, and from twelve to twenty inches long, whereby the tree may be recognized at a distance. It is found in the Sierra Nevada and Coast Range, and is valuable for lumber, as well as for resin and turpentine, extracted from the pitch which exudes when the tree is gashed.

The nut-pine (*Pinus sabiniana*) is remarkable as a conifer for its spreading top, and for its large cones full of edible seeds. It branches out somewhat after the manner of a maple; rarely more than sixty feet high, though often with a trunk four feet through—a thickness of trunk that with most other conifers would give more than double the height. About half-way from the ground to the top, the trunk divides into a number of branches, which grow upward. The nut-pine is found in the lower part of the Sierra Nevada, and in the coast mountains, near the head of the Sacramento Valley. The seeds are larger than the common white bean, and are very palatable, with a slight terebinthine taste. The leaves are from four to ten inches long, and grow in threes. The foliage of the tree, when seen from a distance, resembles that of the willow, both in color and distribution. In places where the nut-pine is found, the woodpeckers select them as storehouses for their winter food, cutting holes in their bark, and putting an acorn in each. The Indians formerly relied upon the nuts for a considerable portion of their food. They climbed the tree by catching hold of the rough, strong bark with their hands, then putting their foot against the tree, without touching it with their body or knees, they walked up till they reached the limbs.

A liquid called erasine, similar to turpentine in its qualities, is distilled from the pitch of the nut-pine.

The Monterey pine (*Pinus insignis*) is extensively cultivated as an ornamental tree, being hardy, quick in growth, and dense and handsome in form and foliage; but it has no value for timber.

Coulter's pine (*Pinus coulterii*) grows in the Santa Lucia Mountains. It reaches a height of one hundred feet, and has a trunk three feet through. Its branches are large and spreading, the leaves a foot long, and pale sea-green in color; the cones seventeen inches long, seven inches through, and like a sugar-loaf in shape.

The twisted pine (*Pinus contorta*) is found in the northern part of the State. The leaves are yellowish green in color, about two inches long, and they grow in pairs. The tree does not exceed sixty feet in height.

§ 284. *Firs.*—The red fir, or Douglas spruce, (*Abies douglasii*) is a tree of very large size, growing to be three hundred feet high, and ten feet thick in the trunk. It is, as Dr. Newberry says, "one of the grandest of the group of giants which combine to form the forests of the West." The wood is strong, but course and uneven in grain; the layers of each year's growth being soft on one side, and very hard on the other. The timber is much used for rough work on houses, and for ship-building. The tree grows in dense forests on the Sierra Nevada and Cascade Mountains, from 35° to 49°, and near the coast north of 39°.

The yellow fir (*Abies pattonii*) bears a close resemblance to the red fir, and the two trees are usually found in company with each other.

The black fir (*Abies menziesii*) is smaller, and of little value.

The *Abies bracheata* (Santa Lucia fir) grows in the Santa Lucia Mountains. The height is about one hundred feet, the shape a perfect cone, the lowest branches resting on the ground. The tree produces a resin used by the Catholic priests for incense.

The Western balsam-fir, (*Picea grandis*) or white fir, attains a height of one hundred and fifty feet, and a diameter of seven feet in the trunk. The bark on the trunks of the young trees contains numerous cysts full of the resinous fluid called the balsam of fir.

§ 285. *Cedar and Cypress.*—Th[illegible] juniper, or cedar, (*Juniperus occidentalis*) grows thirty feet high, and bears a strong resemblance to the juniper (*Juniperus virginianus*) of the Eastern States. The wood of a juniper-tree found near the quicksilver mines of New Idria, is so hard and fine in texture, that it would perhaps be valuable to engravers.

The arbor-vitæ, also called cedar, (*Thuja gigantea*) is a most symmetrical and graceful conifer, growing to be nearly three hundred feet high.

The Californian white cedar (*Libocedrus decurrens*) grows one hundred feet high, and seven feet thick in the trunk. It is found from Mount Shasta to the Tejon Pass. The trunk is usually angular. Many of the trees are affected with a dry-rot, which destroys their value as timber.

The fragrant cedar (*Cupressus fragrans*) is found along the northern coast of the State. It is a large tree, and produces a white, clear lumber, valuable for furniture and the inside work of houses. The wood has a strong, lasting, and not unpleasant odor, half way between turpentine and ottar of roses.

Lawson's cedar (*Cupressus lawsoniana*) is a tree of little value in the forest, but as an ornament it is highly prized. The foliage is dense and graceful in shape, and brighter in color than that of most conifers.

The Monterey cypress (*Cupressus macrocarpa*) is indigenous only on Cedar Point, at Monterey, and there are not more than one hundred trees there; but great numbers of them have been planted for ornament in all the larger towns of the State. It is hardy, and a quick grower, has a dense, graceful foliage, bears clipping well, and makes a fine appearance in all stages of its growth. The largest tree of the kind is six feet in diameter, and sixty feet high. The wood is solid and durable. One tree at Monterey has assumed a remarkable weeping appearance; but I believe no others of that character have been produced from it. Another species, the Gove Cypress, (*Cupressus goveniana*) growing near Monterey, is a handsome, ornamental tree, and does not exceed ten feet in height.

The Western yew is an upright tree from fifty to seventy-five feet high, with thin and light foliage, the leaves being about an inch long. Its growth is straighter, its branches fewer, and its foliage thinner, more feathery, and lighter in color, than the European yew. It grows on the Sierra Nevada from 34° northward to British Columbia.

Many other conifers are found in California, but do not require special description here. Among them are several hemlocks, (*Tsugas*) and various species of pine, and fir.

§ 286. *Nutmeg.*—The California nutmeg (*Torreya californica*) is a graceful and beautiful evergreen, found in the Coast Mountains near the Bay of San Francisco. It grows from fifty to seventy-five feet high, and resembles the Western yew in foliage and general form. The fruit is like a nutmeg in size and shape, but it has a disagreeable terebinthine taste, and is never used as a condiment.

§ 287. *Laurel.*—The California laurel, or bay, (*Oreodaphne californica*) is one of the most common and beautiful trees of the coast valleys. It is an evergreen, which grows to a height of fifty feet, with a trunk sometimes thirty inches in diameter. The leaves are dark green, lustrous, four inches long, one inch wide, sharp at both ends, with smooth edges. The foliage is dense. The wood is grayish in color, very hard, durable, and difficult to split, susceptible of high polish, and in many trees marked with a beautiful grain, so that it has been used for veneering and solid ornamental work. It is sometimes, however, occupied while growing by a boring beetle, which continues its work after the wood has been made into furniture, and destroys its value. The leaves have a strong aromatic odor, resembling that of bay rum.

§ 288. *Madroña.*—The madroña (*Arbutus menziesii*) is one of the most striking trees of the Californian forest. It is an evergreen, with an open growth, somewhat like that of a maple, bright-green and lustrous leaves, and a bright-red bark. Its height is sometimes fifty feet; its diameter in the trunk two feet. The leaves are oval in shape, three inches long, pea-green underneath, and dark and shining above. The bark is smooth, and it peels off at regular seasons; the new bark is a pea-green, which changes to a bright red. The wood is very hard, and is used to some extent in the arts, especially for making the wooden stirrup commonly used in the State. The tree bears a bright-red berry in clusters, of which the birds are fond.

§ 289. *Manzanita.*—The manzanita, (*Arctostaphylos glauca*) another prominent feature in the Californian forest, is a dense, clump-like shrub, which grows as high as twelve feet, and nearly as broad as it is high. The trunk divides near the ground into several or many branches, and these terminate in a great multitude of twigs, so that the shrub is a dense mass of branches and branchlets, all of which are very crooked. The wood is dense, hard, and dark-red in color. The bark is red and smooth, occasionally peeling off and exposing a new light-green bark, which soon turns red. The leaves are regularly oval in form, about an inch and a half long, thick and shining, and pea-green in color; they set vertically upon their stems. The manzanita bears a pinkish-white blossom in clusters, and these are replaced by round red berries about half an inch in diameter, with a pleasant, acidulous taste. The shrub grows in the coast valleys, and in the Sierra Nevada, up near to the limit of perpetual snow. The name means "little apple," *manzana* being the Spanish for apple.

§ 290. *Oaks.*—The Californian white oak, (*Quercus lobata*) or long-acorned oak, is a very large tree, and the characteristic oak of California. It resembles the white oak of the Atlantic slope in the color of its bark and the shape of its leaves; but its growth is very different. It seldom reaches a greater height than sixty feet, and is often wider than high, sometimes measuring one hundred and twenty-five feet from side to side. The trunk, which occasionally grows to be eight feet through, throws out large horizontal boughs within ten feet of the ground, and above that point the trunk is soon lost among the large branches. The tree furnishes no straight timber, and the wood is so soft and brittle as to be of no use in the arts; whereas the white oak of the Mississippi Valley is a most valuable tree, with a trunk so tall and straight, that sills and beams of it sixty feet long are common, and with a wood so tough, that it supplies all the axles and plough-beams of the country. The Californian white oak is not even fit for fence-rails. The tree, however, is very beautiful and majestic, and the open groves of it in the valleys and foot-hills, form, as Dr. Newberry says, "the most important element in those scenes of quiet beauty which so often excite the admiration of the traveler in California." The tree bears much resemblance in form and size to the oak of England, the groves of it appearing like the English parks. At the ends of the large boughs are branches which hang down like vines—giving the tree a weeping character; and one tree in Napa Valley is very strongly marked in that respect. The acorns are large, sometimes two and a half inches long. They once formed the chief article of food of the Californian Indians.

The fulvous oak (*Quercus fulvescens*) is a deciduous tree that grows about thirty feet high, with leaves somewhat like those of the Western chinquapin. The acorn, when young, is concealed in the cup, the two together resembling a little wheel; but the acorn, when mature, is an inch and a half long, and projects considerably beyond the cup. The wood is tougher than that of most of the oaks of California.

Kellogg's oak (*Quercus kelloggii*) is a large deciduous tree, found only in California. Its leaves are deeply sinuate, with three principal lobes on each side, terminating in several acute points. It bears fruit only in alternate years, or at least most abundantly every other year. An idea prevails that the acorns give to swine a disease of the kidneys.

The huckleberry-leafed oak (*Quercus vaccinifolia*) is a shrub, from four to six feet high, which grows on the mountains in the northern part of the State. Its leaves, in size and form, resemble the huckleberry; the acorn is of the size and shape of a small hazle-nut.

In the mountains north of Clear Lake a tough deciduous oak is found, with wood fit for staves and wagon timber, but it is so remote from steam transportation that it has no value at present. It is said that the second growth of some of the oaks in the Sacramento bottom is tough enough for plough beams.

The evergreen oak (*Quercus agrifolia*) is a low, spreading tree, much like an apple-tree in size and shape. The foliage, however, is darker and denser. The acorns are small, thin, and sharp-pointed. The wood is hard, crooked in grain, and valuable for knees in ship building.

The Californian chestnut oak (*Quercus densiflora*) is a low, handsome, evergreen tree, with a leaf like that of the chestnut. The bark is extensively used in tanning. The tree is rare north of latitude 39°, and is most abundant in the mountains about Santa Cruz.

The Western chinquapin, (*Castanea chrysophylla*) or golden-leaved chestnut, is an evergreen shrub that grows in the Sierra Nevada. At the height of three feet it bears an edible and palatable fruit, something like the beech-nut in shape, but larger. The flowers and ripe fruit are often found on the same bush. The leaves are dark-green above, and covered with a yellowish powder beneath. The Western chinquapin grows to be a tree thirty feet high in some parts of Oregon.

§ 291. *Sycamore, etc.*—The Mexican sycamore (*Platanus racemosa*) exhibits a striking resemblance to the Western sycamore of the Atlantic slope. It has the same straggling, irregular growth; the same smooth, white, scaly bark; the same large, yellowish leaf: but instead of having only one ball on a stem, like the Atlantic sycamore, it has several, the stem running through one or two, and terminating in the last one.

The Californian walnut is found in the coast valleys from St. Helena to Los Angeles, but it is not abundant anywhere. The tree is cultivated for ornament and for its nuts.

It is said that there are indigenous chestnuts in Mendocino County. Wild cherries are found in many parts of the State; wild plums in the high mountains, and crab apples in the northern counties.

The Californian horse-chestnut, or buckeye, (*Æsculus californica*) is a bush, or low, spreading tree, abundant in the Sacramento, San Joaquin, and coast valleys. It likes to grow about rocky ledges, in ravines, and on the banks of streams. Sometimes it throws up a dozen stems, which grow to a thickness of three or four inches each; but usually it has one trunk, six or eight inches through. The tree rarely exceeds fifteen feet in height, and it has a hemispherical shape, very dense foliage, rising from the ground in a globular form. It continues to put forth large clusters of fragrant blossoms from early spring till late summer. The leaves are among the first to open of the deciduous trees of the State. Five leaves grow together on one stem. The fruit has a close resemblance to that of the buckeye-tree of the Mississippi Valley, but is larger and more abundant. It is a staple article of food with those few Californian Indians who still depend upon wild fruits and game for their subsistence.

The mountain mahogany is an evergreen found on the eastern slopes of the Sierra Nevada, at an elevation of 6,000 feet above the sea. The leaves are bright and glossy, the growth low, the trunk crooked, the wood red, very even in grain, hard, heavy, and susceptible of high polish, and the yellowish blossoms which cover the tree in the spring are rich in a vanilla-like fragrance.

§ 292. *Poison Oak.*—The poison oak, or poison ivy, (*Rhus toxicodendron*) grows abundantly in the valleys, the Coast

Mountains, and the Sierra, and is a prominent and important feature of the botany of the State. One of the first lessons of the new-comer in California, should be to learn to distinguish and avoid this useless and dangerous plant. The touch of the leaf is poisonous, and causes a very irritating eruption of the skin. It rapidly communicates by the touch from one part of the body to another, causing severe inflammations and swellings. The most delicate parts of the body are most affected by the poison. The eyes are sometimes closed up entirely by the swelling round them; and many cases are recorded of faces so swollen, that they could not be recognized by intimate friends. Some persons are not affected by the touch of the Rhus; but instances have occurred wherein persons supposing themselves, after long experience, to be free from danger, have at last been poisoned: and when the virus has once taken hold, the system is always very easily affected from that time forward. Even passing to the leeward of the bush on a windy day, or going through the smoke of a fire in which it is burning, will bring the poison to the surface again. The poison oak—the leaves often resemble those of the white oak in shape—abounds in the grounds adapted to picnics near the large towns, and many persons are affected by it on such occasions. Many remedies are in use, but none are regarded as a certain cure. Among them are steam baths, lotions of kerosene, manzanita leaves, leaves of the wild sunflower, (*Grindelia*) common salt, saleratus, salpeter, bay rum, and alcohol —each being used separately—poultices of bread and milk, the eating of the buds of the poisonous plant, and homœopathic *Rhus* pills.

The poison oak thrives best on a moist soil, and in the shade. In a thicket with other bushes it sends up many thin stalks eight or ten feet high, with large luxuriant leaves at the top. In the shade, the leaves are green; in the open, dry ground, exposed to the sun, and without support from other bushes, the poison oak is a low, poverty-stricken little shrub, with a few red leaves. It sometimes attaches itself to an oak-tree, becomes a climber, and attains a thickness, though very rarely, of four inches in the trunk, with a height of forty feet.

§ 293. *Various Plants.*—The amole, (*Chlorogalum pomeridianum*) or soap-plant, has an onion-like, bulbous root, which, when rubbed in water, makes a lather like soap, and is good for removing dirt. It was extensively used for washing, by the Indians and Spanish Californians, previous to the American conquest. The amole has a stalk four or five feet high, from which branches about eighteen inches long spring out. The branches are covered with buds, which open in the night, beginning at the root of the boughs, about four inches of a branch opening at a time. The next night, the buds of another four inches open, and so on. The dry bulb abounds in tough fibers, which are separated from the other material, and used as a substitute for hair in mattresses.

The mistletoe grows abundantly on the oak-trees of California. The Spanish moss, (*Evernia jubata*) which hangs in long lace-like gray beards from the branches, also serves to give beauty to the groves in the valleys. We have willows and cottonwood, which differ little in appearance from those of the Mississippi Valley. There are wild grapes, blackberries, gooseberries, huckleberries, raspberries, salmon-berries, and strawberries. A truffle, or a root resembling it, is found in the valleys of the coast and the Sierra Nevada. The grizzly bear considers it a delicacy, and frequently digs it up. A shrub called the "joint-fir," (a species of *Ephedra*) sometimes used for making tea, is found in Calaveras and Tuolumne Counties. In the valleys of the Coast Mountains is found the *yerba buena*, (Spanish for "good herb") a creeping vine, bearing some resemblance in its leaf and vine to the wild strawberry. It has a strong perfume, half-way between peppermint and camphor. The *yerba de la vibora*, (Spanish for "rattlesnake-herb," known to botanists as the *Daucus pusillus*) is a carrot-like vegetable, the leaves of which are said to be a specific for the bite of a rattlesnake. California has no indigenous elms, hickory, beech, birch, persimmon, mulberry, sassafras, locust, catalpa, or magnolia trees.

§ 294. *Nutritious Herbage.* — Of indigenous nutritious grasses, there are a number in the State. The wild oats, though not a grass, may be mentioned under this head. It resembles the cultivated oats so nearly that there has been some doubt whether they are not identical; but the opinion among botanists is that they are distinct species. The wild oat, in the year 1835, was found only south of the Bay of San Francisco; but about that time, when the white men crossed frequently from the southern to the northern side of the bay, the oat was sown in a natural way by horses and cattle, and it spread rapidly over the Sacramento Valley and the coast region. It grew very luxuriantly, and in some places surpassed in the height, size, and abundance of stalks, any field of cultivated oats which I have ever seen. It is said that in some localities the oat-stalks were so high that men sitting erect on horseback could not see each other at a distance of ten feet. The soil and climate were evidently very favorable to it. During the last six or eight years, the wild oats have been eaten down so closely by cattle, that in many places they have been killed out. They are propagated from year to year, not by the roots, but by the seeds, many of which fall into cracks into the earth, where they lie in safety until the rains come, when the ground closes up, and the grain sprouts. The earth cracks in the summer in many parts of the State; and in places where the wild oats grow, the position of the cracks of one year may be traced the next season by the position of the stalks of the grain.

The wild oat grows on hill and plain, and furnishes a large part of the wild pasture of the State. It is wholesome, nutritious, and palatable for cattle. Much of it is cut for hay. The amount of grain which it furnishes is small in proportion to the quantity of straw, and it is never threshed.

After the wild oats, in importance to the herdsman, comes the "burr-clover," so named from a spherical burr, about a quarter of an inch in diameter, which it bears in clusters of three. This burr-clover is found in all the settled parts of the State. Cattle do not like it when green; but after it dries, the burrs fall upon the ground and are picked up by the cattle, while the stranger is astonished at seeing them eating and keeping fat on what appears to him to be bare earth. On examining the surface of the ground, he will find that it is covered with the dry stalks and burrs of the burr-clover. The bloom consists of three very small yellow flowers. It is said that the stalks of this clover take root whenever the joints touch the ground.

The alfilerilla, vulgarly called "filaree," (*Erodium cicutarium*) is another indigenous nutritious herb of much importance to the herdsman. It is succulent, sweet, hardy, bearing clusters of spikes, which are an inch and a half long, and have given it the name of pin-grass. The resemblance of its leaves to the geranium has suggested the name of "wild geranium," by which title it is also known to some persons. Its large root sinks deep into the ground, thus enabling it to resist the drought, while above the surface it puts forth a dense mass of stalks and leaves, spreading out sometimes several feet in every direction. Cattle prefer it to every other indigenous herb of the State. The seeds seem to abound throughout the soil, for wherever the earth is ploughed up for the first time, there the alfilerilla appears, though it may never have been seen there before. It is common in gardens, cultivated fields, and fallow lands.

The white Californian clover has a large yellowish-white bloom, from an inch to an inch and a half in diameter, a beautiful plant, well suited as an ornament for yards and gardens. It grows very large, and is two feet high in moist, favorable situations; while in dry places it will also mature its seed without rising more than two or three inches above the ground. It is very sweet, and it is often eaten by the Indians, who like it both raw and boiled. Cattle are also extremely fond of it.

Another species of clover has a round bloom, about a third of an inch in diameter, composed of violet-tinged flowers.

Another clover has a bloom from a sixth to a quarter of an inch in diameter, the flowers of which are subdued green, tipped with pink at the end.

The *Melilotes officinalis*, commonly called a clover, though not strictly entitled to that name, likes a very moist soil, and then grows luxuriantly, crowding out nearly everything else. Its bloom consists of a drooping head, about an inch long and a sixth of an inch thick, hung with little yellow flowers. Cattle are not fond of this herb in any shape; but they like it better in hay than when green.

Of nutritious grasses there are a number; but they do not, unless where the soil is exceptionally moist, form a sod. The drought of summer and fall seems to kill the roots.

§ 295. *Flowers.*—Of wild flowers there are a great variety and abundance in California, and they have their different seasons for blooming; and in cañons where the soil is always moist, flowers may be seen in every month of the year. In the spring-time the hills are frequently covered with them, and their red, blue, or yellow petals hide everything else. Each month has its flowers: In March the grass of a valley may be hiden under red, in April under blue, and in May under yellow blossoms.

Grace Greenwood, writing in May, said: "The grand California flower-show is at its height. Anything more gorgeously beautiful than the display in meadows and wild pasture lands, on hill-side and river-side, it were impossible for any one but a mad florist to imagine. Along the railroads on either hand runs continuously the rich, radiant bloom. Your sight becomes pained, your very brain bewildered, by watching the galloping rainbow. There are great fields, in which flowers of many sorts are mingled in a perfect carnival of color; then come exclusive family gatherings, where the blues, the crimsons, or the purples, have it all their own way; and every now and then you come upon great tracts, resplendent with the most royally gorgeous of all wild flowers, the yellow, or orange poppy, which an old Russian bear of a botanist has stretched on the rack of the name *Eschscholtzia*, but which long ago some poetic Spaniard, neither a flower "sharp," nor a flatterer of flower sharps, taking a hint from nature, as men were modest enough to do in his time, christened *El copo de oro* [the golden cup]. Every such tract where the sumptuous blossoms stand thick, reminds one of the 'Field of the Cloth of Gold.' They are peculiarly joyous looking flowers, massed together, dancing and hob-nobbing, and lifting their golden goblets to be filled by the morning sun."

The grass and herbage begin to grow and clothe the landscape in green after the first heavy rains of the rainy season. These rains may come in December, January, or February; and until they do come, the earth, in the districts not covered with timber, is brown. The grass continues green until June, when it begins to dry up and turn yellow and brown, which colors then predominate in the landscape until the rains come again. The death of the grass, except at high elevations, is caused not by the cold but by the drought; and in those months when the prairies of Indiana and Illinois are covered with snow, the valleys of California are dressed in the brilliant green of young grass.

The azaleas of California are abundant and rich in perfume; a species of calycanthus, without fragrance, is found in the cañons, and the ceanothus, or Californian lilac, of which there are many species, is a beautiful evergreen shrub, growing about ten feet high, with clusters of lilac-like flowers, of various shades of blue, violet, and red, according to the species. The tree produces a multitude of little twigs, and a dense foliage, and may be trimmed into almost any shape.

§ 296. *Desert Vegetation.*—Many varieties of cactus are found in the southern parts of the State, and in the Colorado Desert they form a considerable portion of the vegetation. The largest is the candelabrum cactus, which grows to a height of fifty feet, and frequently has from two to six branches about half as thick as the trunk. These run out horizontally a foot or two, and then turning at a right angle, rise vertically, parallel with the main stem. Many of the wild cacti bear insipid edible fruits, and yet are prized by the Indians and travelers for their abundant moisture. The dried pitahaya resembles a fig in taste.

Several species of palm grow in the Colorado and Mojave deserts, and one bears an edible date; but the tree is not common nor the fruit abundant. The yucca, or bayonet-tree, sometimes grows to be thirty-five feet in height, with a trunk two feet through; but usually it is about ten feet high, with a trunk eight inches in diameter. It has no twigs or branches, but sometimes it divides into two trunks. The foliage, consisting of leaves eighteen inches long, and shaped like the blade of a bayonet, hangs down from the tops of the trunks.

The mezquit (*Algarobia glandulosa*) is a low tree of the Colorado Desert. It sometimes reaches a height of twenty feet, with a trunk fifteen inches in diameter. The lower branches are very near the ground, and the whole tree has a very regular, semi-spherical form. The leaves are like those of the black locust, and the foliage thin. The tree bears numerous pods, from three to five inches long, full of sweet, nourishing beans, about the size of the common white bean. The mezquit-bean is often eaten by men, and horses and mules are very fond of it.

The curly mezquit (*Strombocarpus pubescens*) is a similar shrub, and bears a crooked bean, called the "screw-bean." It also grows only on the desert.

The maguey, or American aloe, (*Agave americana*) which grows to the height of fifty feet, and a smaller species which rises to a height of eight feet, and is abundant in the southern counties, are indigenous in the State.

§ 297. *Swamp Vegetation.*—The swamp lands of California abound with reeds, or tule as they are here called. The round tule, (*Scirpus lacustris*) the principal species, has no leaf, but a plain, round stalk, sometimes an inch thick at the butt, and fifteen feet high, but usually not more than half so large. It will grow in places constantly covered with water several feet deep, forms a thick mat with its roots, and cannot be killed readily.

The triangular tule grows in shallower water, or in land dry for portions of the year, and neat cattle get fat on it.

The cat-tail flag grows with the tule, but in drier land than the others, and can be killed out with less difficulty. The stalks are used by coopers to put between the staves in their casks, and the fiber of the flower or cat-tail has been gathered for mattresses and pillows.

§ 298. *Marine Vegetation.*—The ocean near the shore from the Golden Gate, southward, has a great variety of algæ or sea-weed, some of which are very beautiful in the delicacy of their forms and the delicate tints of their covering. These are extensively used for ornamental purposes. Others, like the *Macrocystis pyrifera*, have stems of great length, occasionally reaching two hundred yards, grow from a depth of forty feet, and present such a mass of foliage in the water as to perceptibly impede navigation. The larger species of algæ are especially abundant off the coast of Santa Barbara County.

§ 299. *Alpine Vegetation.*—The vegetation on the Californian Alps is peculiar. Both grasses and trees are abundant at elevations much above those in which they flourish in Switzerland. There the trees reach to 6,500 feet above the sea, here to 11,000 feet. There, no tree lives where snow lies through the year; here, two species flourish 1,000 feet above the snow line; and five species that reach a diameter of three feet in the trunk grow at places where the temperature is below the freezing point 350 nights in the year. In general character, the vegetation near the snow line resembles that of the Arctic more nearly than that of the Swiss Alps. There are many bodies of rich pasturage, composed of true grasses and of sedge grasses, at high elevations, and never yet occupied by white men. Mosses are as abundant as in Switzerland. The snow plant, (*Sarcodes sanguinea*) is found frequently below the snow line, but looks prettiest when it shows its brilliant red tints amidst the white mantle from which it derives its name.

CHAPTER XII.

ZOOLOGY.

§ 300. *General List.*—Among the indigenous animals of California are the grizzly bear, the black bear, the cougar, the wild-cat, the gray wolf, the coyote, three foxes, the badger, the raccoon, the opossum, the mountain-cat, the weazel, two skunks, one porcupine, three squirrels, two spermophiles, two ground-squirrels, three rats, three jumping-rats, one jumping-mouse, nine mice, one mole, the elk, one deer, one antelope, the mountain sheep, three hares, two rabbits, the seal, the sea-otter, the sea-lion, the beaver, two vultures, the golden eagle, the bald eagle, the fishhawk, eighteen other hawks, nine owls, the road-runner, twelve woodpeckers, four humming-birds, eleven flycatchers, one hundred and nine singers, one pigeon, two doves, three grouse, three quails, one sandhill crane, forty-one waders, sixty-six swimmers, including two swans and five geese, about two dozen snakes, including the rattlesnake, half a dozen salmon, two codfish, and one mackerel.

§ 301. *Bears.*—The grizzly bear, (*Ursus horribilis*) is the largest and most formidable of the quadrupeds of California. He grows to be four feet high and seven feet long, with a weight, when very large and fat, of two thousand pounds, being the largest of the carnivorous animals, and much heavier than the lion or tiger ever get to be, but ordinarily does not exceed eight or nine hundred pounds in weight. In color the body is a light grayish-brown, dark brown about the ears and along the ridge of the back, and nearly black on the legs. The hair is long, coarse, and wiry, and stiff on the top of the neck and between the shoulders. The "grizzly," as he is usually called, is more common in California than any other kind of bear, and was at one time exceedingly numerous for so large an animal; but he offered so much meat for the hunters, and did so much damage to the farmers, that he has been industriously hunted, and his numbers have been greatly reduced. He ranges throughout the State, but prefers to make his home in the chaparral or bushes, whereas the black bear likes the heavy timber. The grizzly is very tenacious of life, and he is seldom immediately killed by a single bullet. His thick, wiry hair, tough skin, heavy coats of fat when in good condition, and large bones, go far to protect his vital organs; but he often seems to preserve all his strength and activity for an hour or more after having been shot through the lungs and liver with large rifle balls. He is one of the most dangerous animals to attack. There is much probability that when shot he will not be killed outright. When merely wounded he is ferocious; his weight and strength are so great that he bears down all opposition before him; and he is very quick, his speed in running being nearly equal to that of the horse. In attacking a man, he usually rises on his hind legs, strikes his enemy with one of his powerful fore-paws, and then commences to bite him. If the man lies still, with his face down, the bear will usually content himself with biting him for a while about the arms and legs, then go off a few steps, and after watching him a short time, will go away. But let the man move, and the bear is upon him again; let him fight, and he will be in imminent danger of being torn to pieces. About half a dozen men, on an average, are killed yearly in California by grizzly bears, and as many more are cruelly mutilated.

Fortunately, the grizzly bear is not disposed to attack man, and never makes the first assault, unless driven by hunger or maternal anxiety. The dam will attack any man who comes near her cubs, and on this account it is dangerous to go in the early summer afoot through chaparral where bears make their home. Usually a grizzly will get out of the way when he sees or hears a man, and sometimes, but rarely, will run when wounded. It is said that grizzlies, in seasons of scarcity, used to break into the huts of the Indians and eat them. No instance of this kind, however, has been reported for some years past.

The greater portion of the food of the grizzly is vegetable, such as grass, clover, berries, acorns, and roots. The manzanita, service, salmon, and whortleberries, are all favorites with him. The roots which he eats are of many different species, and it was from him that we learned the existence of a Californian truffle, very similar to the European tuber of the same name. The grizzly is very fond of fresh pork, at least after he knows its taste, and which he soon learns if swine come within his reach. The farmers in those districts where the bears are abundant, shut up their hogs every night in corrals or pens, surrounded by very strong and high fences, which the bears frequently tear down. After having killed a hog, if any part of the carcass is left, the grizzly will return at night and feast upon the remains, until it becomes putrid. He prefers, however, the fresh pork, if it can be had. Not unfrequently the grizzly discovers the carcasses of deer, elk, and antelope, killed by hunters, who have gone off after horses to carry their game home. In such case, the hunter usually finds little left for him when he gets back. They do not like climbing, and rarely attempt to ascend trees. The grizzly, though he often moves about and feeds in the day, prefers the night, and almost invariably selects it as the time for approaching houses, as he often does, in search of food. The cub is one of the most playful, good-humored, and amusing of animals. He will tumble somersets, sit up on his haunches and box, and in some of his pranks will show a humor and intelligence scarcely inferior to that of very young children. The grizzly may easily be tamed, and its becomes very fond of its master. Adams, the Californian mountaineer and bear-hunter, trained several grizzlies so that they accompanied him in his hunting excursions, defended him against wild animals, and carried burdens for him. The meat of the young grizzly resembles pork in texture and taste, exceeding it in juiciness and greasiness; but the meat of the old he-bear is extremely strong, and to delicate stomachs it is nauseating.

The black bear (*Ursus americanus*) is found in the timbered portions of California, but is not abundant anywhere, and is more frequently seen near the coast north of Bodega than in any other portion of the State. Dr. Newberry, speaking of the food of the black bear on this Coast, says: "The subsistence of the black bears in the northern portion of California is evidently, for the most part, vegetable. The manzanita, wild plum, and wild cherry, which fruit grow profusely, and are very low, assist in making up his bill of fare. Rarely, too, we saw trees of yellow-pine bearing marks of bears' teeth, where they had torn off the outer bark to get at the succulent inner layer, which is capable of sustaining life, and to which the Indians very generally have recourse when pressed with hunger." It is believed that neither the grizzly nor the black bear hybernates in California.

§ 302. *Felines.*—The cougar panther of California, supposed by Dr. Newberry to be the *Felis concolor*—the same with the panther found on the Atlantic slope of the continent—has a body larger than that of the common sheep, and a tail more than half the length of the body. Its color is dirty-white on the belly, and elsewhere a brownish-yellow, mottled with dark tips on all the hairs. The panther is a cowardly animal, and, except when driven by some extraordinary motive, never attacks man. A friend of mine, who was out hunting, dressed in a buff coat, was creeping through some brush to get near a deer, when he felt a heavy animal strike his back. He sprang up very suddenly, and saw a panther which had jumped down upon him from a tree, probably mistaking him for a calf or a deer. The brute seemed very much astonished and frightened at seeing a man there, and immediately fled at full speed. The panther is nocturnal in his habits, and always prefers the night as a time for attacking colts, which are a favorite prey with him. He is found in all parts of the State where there is timber, but he never stops long in any place, unless he can find bushes to hide in.

The American wild-cat (*Lynx rufus*) is common in California, particularly in the vicinity of the bays of San Francisco and San Pablo, where he often catches fish and water-fowl, as well as land-animals. His color is a light brown, with dim, dark spots on the sides, and longitudinal lines along the middle of the back.

§ 303. *Canines.*—The coyote is very common in the State, and occupies the same place here with that occupied in the Mississippi Valley by the prairie-wolf. Dr. Newberry thinks the two belong to the same species, (*Canis latrans*) but I am inclined to believe that they are specifically different. The color of the coyote has more of a reddish tinge, he howls more, does not bark so much, and is more cunning. His food consists chiefly of rabbits, grouse, small birds, mice, lizards, and frogs; and in time of scarcity he will eat carrion, grasshoppers, and bugs. He is very fond of poultry, pigs, and lambs, and will destroy almost as many of them as would a fox. He is one of the worst enemies and most troublesome pests of the farmer. His method of catching chickens is to hide near the hen-roost about daylight, and, as the hens come down, he pounces upon them from his hiding-place; and his motions are often so quick, that the victim has not even time to squall before she dies. In the spring and autumn, when wild geese and ducks are abundant, many coyotes make their homes in the tules, where they catch birds wounded by the hunters.

The coyote loves nothing better than a young pig. When he sees an old sow with her young ones, he will hide, and wait a long time, in hopes that a little one will come within his reach; but if there be no hiding-place, he goes up boldly. The sow will at once face the assailant, and start to attack him. He allows her to come up within a few feet of him, and then moves off slowly; and she, like a fool, thinking she will catch him, continues the chase. While running, he keeps his head turned to one side, partly to watch her, and partly to watch the pigs; and when he has seduced her far enough away, he suddenly makes a dash at the pigs, and, getting one of them, runs off with it, leaving the agonized and furious sow far behind. If the coyote does not succeed in getting a pig at the first attempt—that is, if he does not lead the sow far enough away—he tries it again and again, till he succeeds, the sow being so stupid as to follow him, after having repeated opportunities to see his purpose.

The coyotes frequently go in packs, and sometimes will attack a cow. On such occasions, they have a concerted plan of operations: they surround their intended victim, and while those in front rush at her as a feint, those behind attempt to cut her hamstrings; and when they are once cut, she falls completely at their mercy; and they quickly pick her bones.

The coyote is a great thief, and will steal the pillow from under a sleeping man's head; for it happens in California that bags of provisions are often used as pillows. When hungry, he will gnaw anything that is greasy, and frequently cuts off the hemp and rawhide ropes with which horses are tied out at night; but he never bites into hair ropes, which for that reason were formerly used exclusively for staking out horses.

The coyote is nocturnal in his habits, and is very fond of howling or yelping. He begins with a shrill, quick bark, and follows it with a succession of yelps, ending in a long-drawn, quavering, melancholy howl. When one begins, all others within hearing take up the cry. Twenty years ago, the traveler in the Sacramento Valley rarely passed a night without hearing their music. They are not so numerous now, but still they are frequently seen in the most densely-settled parts of the country.

The gray wolf (*Canis occidentalis*) was once found in all parts of California, but has become very rare in the more densely-settled districts.

The red fox (*Vulpes fulvus*) is found north of latitude 37°; the gray fox (*Vulpes virginianus*) in all the timbered parts of the State. The coast fox (*Vulpes littoralis*) is found only on the island of San Miguel, off the coast of Santa Barbara. In its color it bears a great resemblance to the gray fox, but it is not more than half as large, is less cunning, and is slower in its motions. Its tail is only one-third the length of its body. The specimens observed were very bold and stupid, allowing themselves to be caught over and over again in the same manner.

The desert fox, (*Vulpes macrourus*) which is found in the central deserts of the continent, crosses the Sierra Nevada, and is often killed in Calaveras and Tuolumne Counties.

§ 304. *Badger, etc.*—The American badger (*Taxidea americana*) is abundant on the plateau of the Sierra Nevada, and is occasionally found in other parts of the State. It is very shy, and is rarely seen by the traveler.

The black-footed raccoon (*Procyon hernandezii*) is found in the timbered portions of the Pacific slope of our continent from Santa Barbara to British Columbia. It is longer than the Atlantic raccoon, (*Procyon lotor*) but it resembles it very closely in its mental character and capacity, habits and appearance. The raccoon is fond of grapes, and when he enters a vineyard selects those of the finest flavor.

An opossum (*Didelphys californica*) is found in the wooded portions of the State, but is not abundant.

The yellow-haired porcupine (*Erethizon epixanthus*) a native of California, is the largest of its genus. The spines are a couple of inches long, yellowish in color, with brown tips. On the lower part of the sides the spines are replaced by long, stiff bristles.

The mountain cat, or striped bassaris (*Bassaris astuta*) is abundant along the western base of the Sierra Nevada, between latitudes 36° and 39°. The body is about the size of that of the domestic cat, but the nose is very long and sharp, and the tail very long and large. The color of the animal is dark gray, with rings of black on the tail. The miners call it the "mountain cat," and frequently tame it. It is a favorite pet with them, becomes very playful and familiar, and is far more affectionate than the common cat, which it might replace, for it is very good at catching mice.

The pine-marten (*Mustela Americana*) is found in California, but is rare.

The yellow-cheeked weazel (*Putorius xanthogenys*) is found along the coast, in the vicinity of the Bay of San Francisco.

The common mink (*Putorius vison*) has a skin as valuable as that of the beaver; the fur is of a dark, brownish chestnut color, with a white spot on the end of the chin.

California has two skunks, (*Mephitis occidentalis* and *Mephitis bicolor*) very common animals. The *Mephitis bicolor*, or little striped skunk, is chiefly found south of latitude 39°; the other in the northern and central parts of the State. The colors of both are black and white.

§ 305. *Squirrels.*—The Californian gray squirrel, (*Sciurus fossor*) the most beautiful and one of the largest of the squirrel genus, inhabits all the pine forests of the State. Its color on the back is a finely-grizzled bluish gray, and white beneath. At the base of the ear is a little woolly tuft, of a chestnut color. The sides of the feet are covered with hair in the winter, but are bare in the summer; the body is more slender and delicate in shape than that of the Atlantic gray squirrel. It sometimes grows to be twelve inches long in the head and body, and fifteen inches long in the tail, making the entire length twenty-seven inches. Dr. Newberry says: "The Californian gray squirrel is eminently a tree-squirrel, scarcely descending to the ground but for food and water, and it subsists almost exclusively on the seeds of the largest and loftiest pine known, (*Pinus lambertiana*) the 'sugar-pine' of the Western coast. The cones of this magnificent tree are from twelve to sixteen inches in length, and contain each one hundred or more seeds of the size and shape of the small white bean of commerce. These cones would be unmanageable by the squirrel in the tree, and he has the habit, so common in the family, of dropping them to the ground, where he can dissect them at leisure. This he usually does early in the morning, climbing to the extremities of the topmost branches, where the cones hang, and cutting off a sufficient number to supply his wants for the day. He then descends, and, commencing at the base of the cone, tears off the scales in rapid succession, and skilfully possesses himself of the seeds which they conceal. He is compelled, however, to supply other wants than his own, for the smaller pine-squirrel (*Sciurus douglasii*) and the ground-squirrel (*Tamias townsendii*) appropriate a large share of his booty. When oak-trees are near, and acorns are ripe, he has recourse to them for subsistence; as often as opportunity offers, robbing the woodpeckers of their stores, in which also he has the active coöperation of his more diminutive congeners. From the fact that he feeds upon the ground, it has been supposed that he was less active, and less fitted for climbing, than most tree-squirrels. This, I think, is not true. He is exceedingly quick and graceful in his movements; and if less frequently seen to spring from tree to tree than the black and gray squirrels of eastern States, it is because he inhabits coniferous trees, which are remarkable for the insignificance of their branches compared with the size of the trunk, the limbs never stretching out and interlocking, as those of the oak and maple and other trees, in which our common species live."

The Californian pine-squirrel (*Sciurus douglasii*) inhabits the pine and redwood forests of the State. He is gray above and red beneath, with a black stripe separating the two colors. He lives in a burrow or hollow log, but climbs well, and obtains his food chiefly from the pine-cones, which he cuts off in numbers at a time, and tears to pieces at his leisure, after they have fallen to the ground. He lays up a store of the seed in his burrow, for his winter supply. He is quick in his motions, graceful in his attitudes, and shy in his habits.

The Missouri striped ground-squirrel has five dark-brown stripes on the back, separated by four gray stripes; the sides are reddish-brown, the belly grayish-white, and the tail rusty-black above and rusty-brown beneath. The animal is four or five inches long. It is found in the northern parts of the State. It eats acorns and the seeds of the pine, manzanita, and ceanothus, in the thickets of which last-named brush it prefers to hide its stores.

Report says a flying squirrel has been found in Mendocino County, but I believe it has never been described.

§ 306. *Spermophiles.*—The spermophile has two species in California, which resemble each other so closely, that they are usually supposed to be the same; they are popularly known as the Californian ground-squirrels, the little pests which are so destructive to the grain crops. Their bodies are ten or eleven inches long in the largest specimens; the tail is eight inches long and bushy; the ears large; the cheeks pouched, and herein consists the chief difference between them and squirrels; the color above, black, yellowish-brown, and brown, in distinct mottlings, hoary-yellowish on the sides of the head and neck, and pale yellowish-brown on the under side of the body and legs. They dwell in burrows, and usually live in communities in the open, fertile valleys, preferring to make their burrows under the shade of an oak-tree. Sometimes, however, single spermophiles will be found living in a solitary manner, remote from their fellows. Their burrows, like those of the prairie-dog, are often used by the rattlesnake and the little owl. Dr. Newberry says: "They are very timid, starting at every noise, and at every intrusion into their privacy, dropping from the trees, or hurrying in from their wanderings, and scudding to their holes with all possible celerity; arriving at the entrance, however, they stop to reconnoitre, standing erect, as squirrels rarely and spermophiles habitually do, and looking about to satisfy themselves of the nature and designs of the intruder. Should this second view justify their flight, or a motion or a step forward still further alarm them, with a peculiar movement, like that of a diving duck, they plunge into their burrows, not to venture out till all cause of fear is past. Should you in the meantime have seated yourself with your back against a tree, and have remained for a time as immovable as the trunk against which you lean, you will see sundry little heads protruding from the burrows, with as many pairs of eyes and ears skilled to detect the least sign of danger from their equally-feared enemies, the coyote, the Californian vulture, the red-shouldered and red-tailed hawk, and man himself. If, however, your silence and quietness persuade them that you are none of these, they will swarm forth from their holes, and at first timidly, but, gaining confidence, more fearlessly, engage in all the sports and antics for which the *sciuridæ* are noted, and in which none excel the species under consideration. It is a pretty sight, and one to which I have often treated myself, to sit down quietly under these old oaks, and watch the squirrels running about over the grass and trees, gambolling and playing together. As far as the eye could reach through the vista, the sprightly movements of these innocent animals could be discerned."

The two species are called Beechey's spermophile (*Spermophilus beecheyi*) and Douglas's spermophile (*Spermophilus douglasii*). The size, habits, and general appearance of the two species are the same, but they differ in the color of a stripe along the spine from the base of the head to the middle of the back; in Beechey's spermophile it is yellowish-hoary, in Douglas's it is dark-brown. The former species is found very abundantly south of the Straits of Carquinez; the latter north of it, and fewer in number.

Beechey's spermophiles are among the most formidable enemies of the farmer in those districts where they make their homes. They increase very rapidly in the vicinity of farms, and do great damage in grain-fields and gardens; they eat grain and garden vegetables in all stages of their growth; they peel young fruit-trees and vines; they are, in short, dangerous to nearly everything that is cultivated. They are very industrious, and lay up large stores for the winter, spending several hours every pleasant summer's day in gathering food. They go considerable distances to fields; and the traveler, whose approach scares them, sees them in hundreds running across the road before him, with their tails erect, hurrying from the field to hide themselves in their burrows. Many a large wheat-field, which would have yielded forty bushels to the acre if there had been no spermophiles to trouble it, is so despoiled by them, that the crop will not pay for harvesting. They are particularly abundant in the Santa Clara, Amador, and Pájaro Valleys; and their number is an important consideration in the estimate of the price of land. They will not live in moist land, nor very near the ocean, where the fogs prevail. Away from cultivated fields, they depend for food chiefly upon grass-seeds, grass-roots, and acorns.

§ 307. *Gopher.*—The Californian gopher (*Thomomys bulbivorus*) is, next to Beechey's spermophile, the most abundant and most troublesome rodent of the State. When full grown, it has a body six or eight inches long, with a tail of two inches. The back and sides are of a chestnut-brown color, paler on the under parts of the body and legs; the tail and feet are grayish-white; the ears are very short. In the cheeks are large pouches, covered with fur inside, white to their margin, which is dark brown.

The gopher inhabits the fertile valleys of the coast, from latitude 34° to 39°. He spends nearly all his time under ground, and does most of his mischief there, gnawing off the roots of fruit trees and garden vegetables, eating newly-sown grain and seeds, and nibbling at flowers and sweet buds.

The Colorado gopher (*Thomomys fulvus*) is found in that portion of the State south of latitude 34°, but is not abundant. It is smaller than the Californian gopher, and has more of a reddish tinge in its colors. Its habits and appearance otherwise are very similar to those of its northern congener.

The broad-headed gopher, (*Thomomys laticeps*) found in the vicinity of Humboldt Bay, is about five inches long. Its color on the back, sides, and belly, is yellowish-brown, with a reddish tinge between the fore legs.

§ 308. *The Rats.*—California has a number of indigenous kangaroo-rats or jumping-rats, jumping-mice, and other rats and mice, too many and not sufficiently singular, or interesting to the general reader, to deserve a complete description here. Among these, Philip's jerboa, in the Sacramento Basin and the Southern Valleys, the Don jerboa, in the Coast Valleys, south of San Francisco, each twelve inches long, from the nose to the end of the tail, are the largest of the jumping-rats. They will leap four or five times their length at every jump.

The Oregon mole (*Scalops townsendii*) is found near the bay of San Francisco, and perhaps in other parts of the State. It is six or seven inches long, nearly black in color, with faint-purplish or sooty-black reflections in the hair.

§ 309. *Deer.*—The American elk (*Cervus canadensis*) is found in California, as well as in many other parts of the continent. The animal is nearly as large as a horse, and has some resemblance to it in general shape, though smaller, and slimmer in the head, neck, and legs. Its length from the nose to the tail is seven feet; its height five feet; its greatest weight one thousand pounds. The color is a chesnut brown, dark on the head, neck, and legs, lighter and yellowish on the back and sides. The horns are very large, sometimes more than four feet long, three feet across from tip to tip, measuring three inches in diameter above the burr, and weighing, with the skull, exclusive of the lower jaw, forty pounds. The horns of the old bucks have from seven to nine, perhaps more, prongs, all growing forward, the main stem running upward and backward. The elk were very abundant in California previous to 1849, and they were frequently seen in large herds; but within the last ten years they have become rare, and before the close of another decade they will be extinct in our State. A few were found in the San Joaquin Valley, but the best place for hunting them is in Mendocino County. Several score of carcasses find their way every year to the San Francisco market. The young fat elk furnishes a very juicy and sweet vension.

The white-tailed Virginian deer, once common in the States east of the Mississippi, is not found in California, but in its place we have the black-tailed deer, (*Cervus columbianus*) which is a little larger and has brighter colors, but does not furnish as good vension, the meat lacking the juiciness and savory taste of the venison in the Mississippi Valley. The average weight of the buck is about one hundred and twenty pounds, and of the doe one hundred pounds, but bucks have been found to weigh two hundred and seventy-five pounds. The summer-coat of the black-tailed deer is composed of rather long and coarse hair, of a tawny brown, approaching chestnut on the back. In September this hair begins to come off, exposing what the hunters call the "blue coat," which is at first fine and silky, and of a bluish-gray color, afterward becoming chestnut brown, inclining to gray on the sides, and to black along the back. Occasionally, deer purely white are found. The horn, when at it greatest length, is about two feet long, and forks near mid-length, and each prong forks again, making four points, to which a little spur, issuing from near the base of the horn, may be added, making five in all. This is the general form of the horn; sometimes, however, old bucks have but two points.

The deer likes the hills and the timber; the prong-horned antelope (*Antilocapra americana*) loves the valley and the open land. Before the Americans took California, the Sacramento and San Joaquin Valleys abounded with herds of antelope; but now they are rare in the northern part of the State, and not abundant in the southern part. Many are killed yearly for the market. In size the antelope is not quite so large as the Californian deer, which it resembles closely in form and general appearance. They are distinguished at a distance by their motion: the antelope canters, while the deer runs; the antelope go in herds, and move in a line following the lead of an old buck, like sheep, to which they are related; while deer more frequently are alone, and if in a herd they are more independent, and move each in the way that suits him best. In color, the back, upper part of the sides and outside of the thighs and forelegs, are yellowish brown; the under parts, lower part of the sides, and the buttocks as seen from behind, are white. The hair is very coarse, thick, spongy, tubular, slightly crimped, or waved, and like short lengths of coarse threads cut off bluntly. The horns are very irregular in size and form, but usually they are about eight inches long, rise almost perpendicularly, have a short, blunt prong in front, several inches from the base, and make a short backward crook at the top. The female has horns as well as the male. The hoof is heart-shaped, and its print upon the ground may be readily distinguished from the long, narrow track of the deer. The antelope is about two feet and a half high, and four feet long from the nose to the end of the tail.

The mountain sheep (*Ovis montana*) is found on the Sierra Nevada, from the Tejon Pass to the Oregon line, but is a rare and very shy animal, and is seldom killed. Its length is about five feet, and its weight sometimes three hundred and fifty pounds, considerably greater than that of the deer or domesticated sheep. The color is white beneath, grayish brown elsewhere. The horns of the ram are very large, sometimes five inches through at the base and three feet long. The horns, after starting upward, turn backward, then downward, and so round with a circular or spiral shape, the tip inclining outward. Mountaineers assert that these horns are used by the sheep in getting down from the high cliffs which he is fond of frequenting. Instead of clambering down toilsomely over the rugged and broken rocks, he makes an easy job of it by leaping headlong, confidently down, over precipices fifty, yes, one hundred feet high, and alights head first on his horns, which are strong enough to be unbroken by the shock, and elastic enough to throw him ten or fifteen feet into the air—and the next time he alights on his feet all right.

§ 310. *Hare.*—The Californian hare, or "jackass rabbit," as it is commonly called, (*Lepus californicus*) is one of the largest of its class, growing sometimes to be two feet long from the nose to the end of the tail. Its ears are very large, and have suggested the vulgar name. It was once abundant in all the valleys from the Klamath to the Colorado; it is more rare now. The color beneath is a pale cinnamon; above it is mixed black and light cinnamon, the longest hairs being of a light smoky-ash color for about half the length, then dark sooty-brown, then pale cinnamon-red, and finally black at the tip.

The prairie hare (*Lepus campestrus*) also, one of the largest hares, inhabits the plateau of the Sierra Nevada, Pit River Valley, and the country about the Klamath lakes. It is all white in winter; in summer yellowish gray, with brownish tinges above and white beneath. The length, from the tip of the nose to the root of the tail, is from seventeen to twenty-three inches; and the tail and ear each measure about four inches.

Audubon's hare (*Lepus audubonii*) inhabits the coast valleys from Petaluma to San Diego. It is fifteen inches long, with a tail measuring to the end of the hairs on it three inches. The color is mixed yellowish-brown and black above, white beneath, thighs and rump grayish.

Trowbridge's hare (*Lepus trowbridgii*) is found along the coast southward from 39°. The length is from eleven to fifteen inches; the tail, with hair and all, less than an inch. The back is yellowish brown mixed with dark brown, paler on the sides, and ash-colored beneath.

The sage rabbit (*Lepus artemisia*) is found in all the open parts of California north of the Straits of Carquinez. It is from eleven to sixteen inches in length; in color, brown above and white beneath, with a yellowish tinge, the under part of the neck a yellowish brown. The fur on all parts of the body is lead-colored at the base.

§ 311. *Sea-Lions.*—The sea-lions, of the *Otaria* genus, frequent the coast from May to November, making their homes during the winter in some other clime, but where is not known. They delight to collect on clear summer days on rocks near the water's edge, and bask in the sun. They may be seen nearly every day on the rocks near the Golden Gate, and heard, too, for they keep up a kind of barking or growling in chorus, which grows louder as they see any one approaching. They do not wait, however, to let a man come very near, but pitch off into the sea before he is within fifty yards of them. Their color varies from light yellowish-brown to dark brown and dark iron-gray. They have no mane like that of their relatives in higher latitudes. Fish and birds are their diet, and both are caught with great activity and some stratagem. When a sea-lion sees a gull swimming, he will dive and try to come up under the bird, which he at once seizes; or if the bird is hovering over the water, the sea-lion will dive, and come up near the place, but keep under the water, the surface of which he breaks, as if a fish were there, and when the gull comes down to make a catch he is himself caught. [illegible] lion grows to be ni[illegible].

Sea elephants are found occasionally on the coast of California, and on a few islands, and not elsewhere north of the equator. They are killed for their oil, each full-grown animal yielding from 90 to 180 gallons. They shed their coat every year, and then suddenly change their color from a yellowish brown to a dark gray, which continues for four or five months, and then alters gradually. The animal sometimes reaches a length of eighteen feet.

§ 312. *Otter, etc.*—The American beavers (*Castor canadensis*) were once very abundant in all the large streams of California, and it was chiefly for their sakes that the first American trappers entered the country, about 1827. They are still found in the Sacramento and San Joaquin Rivers. They rarely build dams in California, but live in burrows in the banks. When they dive they slap the water with their tails, making a noise that can be heard at a considerable distance on a still night. Their skins, which once commanded very high prices, have lost much of their value since the adoption of silk for making hats.

The common mink (*Putorius vison*) is found in California, but is not abundant. The general color of the animal is dark brownish-chestnut, with a white spot on the end of the chin. The skin of the mink is as valuable as that of the beaver.

The Californian otter (*Lutra californica*) is found all along this coast, and was formerly abundant on all the large streams. It is carnivorous, living entirely on fish and shell-fish. It prefers large streams and lakes for its home, while the plant-eating beaver prefers small streams. The Californian otter is sometimes five feet long from the point of the nose to the tip of the tail. When in the water, its hair is at times beautifully iridescent.

The sea-otter (*Enhydra marina*) is larger than the Californian otter, and is also carnivorous. It generally makes its home near islands, and roams about in the water within ten or twenty miles of land. The sea-otter was at one time very abundant along the coast of California, and it was one of the attractions which induced the Russian Fur Company to establish a post at Fort Ross, in latitude 38° 30′, where a number of Aleutian Indians were employed, from 1812 to 1840, in the otter fishery. They would start out in their little single canoes, made water-proof with a covering of fish-bladders, so that there was no danger of their sinking if the sea should sweep over them, and thus they would go out fifty miles to sea, and travel up and down the coast, usually coming home well-laden with sea-otter skins, worth sixty or eighty dollars each. The sea-otter is still abundant on the southern coast, and there are men in Santa Barbara County who make it a business to hunt them.

"The otter," says Mr. W. A. Wallace, "is very harmless, and always seeks to escape from human observation. When attacked they make no resistance, but endeavor to escape by sinking in the sea. If closely pursued and there is no escape, they scold and grin like an angry cat. If they escape the enemy, as soon as they are safe, they turn and deride him with various diverting tricks, such as standing on end in the water, jumping over the waves, holding the paws over the eyes, as if to shade them from the sun while looking at the enemy—then lying flat upon the back and stroking the belly. In their escape they carry their sucklings in their mouths, and drive before them those not fully grown. They were formerly taken by the Russians and Indians, by means of nets, clubs, and spears. The young are said to be delicate eating, the flesh resembling lamb. The flesh of the old ones is insipid and tough.

"The otter is never seen upon land. He is purely an aquatic animal. When he swims he turns upon his back, and propels himself with great rapidity. The fore-paws are rounded like a cat's, but the claws of the older ones are generally worn off. The hind-legs, or propellers, are broad and flat, like paddles, and are used very dexterously. The seal much resembles the otter, seen at a distance, but he swims upon his belly, and the hunter seldom mistakes one for the other. The otter sleeps in the water, lying upon his back, and anchors himself from the motions of winds and waves by drawing a string of kelp across his breast, just below his fore-legs. When discovered in this position, they are often approached very near by the hunters. They are very buoyant in the water, but when the chase has been long continued, and the blood of the otter becomes heated by the exercise, on being shot the body sinks rapidly to the bottom, and never rises. More than half the otters shot are lost in this way.

"Once a day the otter comes near the shore for food. He eats every thing that grows in salt water, and is particularly fond of abelones, (*haliotus*) mussels, and sea-eggs. At high water the abelone loosens its shell from the rock, to receive the nourishment which the overflowing waters bring to it, and it is then easily taken from the rock and removed from its shell. The otter is well acquainted with all the peculiarities of this mollusk, and takes this opportunity to capture it for food."

The common seal, a species of phoca, is abundant along the coast.

§ 313. *Vultures.*—The Californian vulture, (*Cathartes californianus*) sometimes improperly called "condor," the largest bird on the continent, and next to the condor the largest flying bird in the world, inhabits all parts of the State, though it is not abundant in any place. It is as prominent and peculiar a feature of the birds of California, as the grizzly bear among the quadrupeds. It is very shy, and is rarely killed. The total length of the Californian vulture is about four feet, and its width from tip to tip of the outstretched wings, ten feet or more. Its color is brownish black, with a white stripe across the wings. The head and neck are bare, and red and yellow in color. The bill is yellowish white, and the iris carmine. Dr. Newberry says: "A portion of every day's experience in our march through the Sacramento Valley, was a pleasure in watching the graceful evolutions of this splendid bird. Its flight is easy and effortless, almost beyond that of any other bird. As I sometimes recall the characteristic scenery of California, those interminable stretches of waving grain, with here and there, between the rounded hills, orchard-like clumps of oak, a scene so solitary and yet so home-like, over these oat-covered plains and slopes, golden yellow in the sunshine, always floats the shadow of the vulture."

Dr. Heermann, of the United States Pacific Railroad Survey, wrote thus: "Whilst unsuccessfully hunting in the Tejon Valley, we have often passed several hours without a single one of this species being in sight, but on bringing down any large game, ere the body had grown cold, these birds might be seen rising above the horizon and slowly sweeping towards us, intent upon their share of the prey. Nor in the absence of the hunter will his game be exempt from their ravenous appetite, though it be carefully hidden and covered by shrubbery and heavy branches; as I have known these marauders to drag forth from its concealment and devour a deer within an hour. Any article of clothing thrown over a carcass will shield it from a vulture, though not from a grizzly bear, who little respects such flimsy protection. My coat, used on one occasion to cover a deer, was found on our return torn by bruin to shreds, and the game destroyed. The Californian vulture joins to his rapacity an immense muscular power, as a sample of which it will suffice to state that I have known four of them, jointly, to drag off, over a space of two hundred yards, the body of a young grizzly bear weighing upward of one hundred pounds."

The turkey-buzzard, or turkey-vulture, (*Cathartes aura*) specifically the same with the bird known by that name in the Atlantic States, is found in all parts of California. From the tip of the bill to the end of the tail it is about thirty inches long, and six feet from tip to tip of the outstretched wings. The head and neck are bare, covered with a bright-red wrinkled skin. The plumage commences below that, with a circular ruff of projecting feathers. The color of the plumage is black, with a purplish lustre, many of the feathers having a pale border. The bill is yellowish in color.

§ 314. *Eagles.*—The golden eagle (*Aquila canadensis*) inhabits California, and indeed all parts of North America. Its length is thirty or forty inches; its color on the head and neck is yellowish brown, white at the base of the tail, and brown, varying to purplish brown and black, elsewhere.

The bald eagle (*Haliœtus leucocephalos*) was abundant in California ten years ago, and is still often seen along the Sacramento, San Joaquin, and Klamath Rivers. It frequents rapids for the purpose of catching fish, which seem to furnish the larger part of its food. It is from thirty to forty inches long, white on the head, and at the base of the tail, and brownish black on the breast, wings, and back.

The fish-hawk (*Pandion carolinensis*) is found along all our large rivers. It is from twenty to twenty-five inches long. The head and under parts are white, with pale yellowish-brown spots on the breast, the back, wings, and tail are dark brown.

The goshawk (*Astur atricapillus*) is of the same size with the fish-hawk, and in color is dark—a bluish slate above, and mottled-white and light ashy-brown beneath.

There are seventeen other hawks in the State, most of them small and rare.

§ 315. *Owls.*—California has nine species of owls, namely: the barn, great-horned, screech, long-eared, short-eared, great gray, saw-whet, burrowing, and pigmy owls. All of them are found extensively on the continent, beyond the limits of our State, and all save the last two are common east of the Mississippi.

The burrowing owl (*Athene cunicularia*) is ten inches long, ashy-brown above and whitish-brown beneath, variegated by spots and bands of white and dark-brown. Dr. Newberry says: "The burrowing owl is found in many parts of California, where it shares the burrows of Beechey's and Douglas's spermophiles. We usually saw them standing at the entrance of their burrows. They often allowed us to approach within shot, and, before taking flight, twisting their heads about, bowed with many ludicrous gestures, thus apparently aiding their imperfect sight, and getting a better view of the intruder. When shot at and not killed, or when otherwise alarmed, they fly with an irregular jerking motion, dropping down much like a woodcock at some other hole."

The pigmy owl (*Glaucidium gnoma*) is seven inches long, and inhabits the wooded districts. It flies about actively in the daytime, and appears to subsist chiefly on sparrows, which it catches in daylight. The general color is brownish-olive above and brownish-white beneath.

§ 316. *Road-runner.*—The paisano, or road-runner, (*Geococcyx californianus*) is one of the most remarkable birds in the State. It lives almost entirely upon the ground, very rarely flies, and frequents the highways, along which it will run from any one approaching. Its speed is nearly equal to that of a common horse, and it often furnishes an exciting chase to the solitary rider. It is found only in the valleys and low hills, and makes its home among the bushes. The bird is akin to the cuckoo, and its generic name signifies "ground-cuckoo." Its length is from twenty to twenty-three inches, of which twelve are taken up by the tail. The color is olive-green above and white beneath; the central tail feathers are olive-brown, the others dark-green—all edged and (except the central two) tipped with white. Dr. Heermann says: "I have not witnessed the following feat, but am assured by many old Californians that this bird, on perceiving the rattlesnake coiled up asleep, basking in the sun, will collect the cactus and hedge him around with a circle, out of which the reptile, unable to escape, and enraged by the prickly points opposing him on every side, strikes himself, and dies from the effects of his self-inoculated venom." The Los Angeles *Star*, in one of its numbers published in February, 1871, says the paisano will attack the snake when awake, and if it fails to kill him at the first stroke of the beak, will surround him with the cactus leaves, while the rattler remains coiled up, ready for another attack. After the thorny fence is completed, the bird again strikes the reptile till it is dead. One snake thus killed was four feet long.

§ 317. *Woodpeckers.*—There are eleven species of woodpecker in the State, and two of them, the Californian (*Melanerpes formicivorus*) and Lewis's (*Melanerpes torquatus*) are worthy of special mention.

The Californian woodpecker is called by the Spanish Californians the *carpintero*, or carpenter, because he is in the habit of boring holes with his beak in the bark of the nut-pine, redwood, Californian white oak, and Western yellow pine, and then storing acorns in them for his winter use. The holes are just large and deep enough to hold each an acorn, which is hammered in so that there is no danger of its falling out. The acorns on the northern side of the tree, where they are protected from the rains, which come from the southward, often keep good for years. The bark of the nut-pine is preferred, probably being softer and more regular in grain than any other bark. The holes are bored to within two or three feet of the ground, and to a height of fifty feet—sometimes, but rarely, in the limbs as well as the trunk. From thirty to fifty holes are often found in a square foot. In seasons when or places where acorns are rare, the woodpecker will put away hazel-nuts in the same manner. The squirrels often plunder the stores, and then the birds attack the thieves, darting down upon them and pecking them with their beaks. When the squirrel sees the property-owner coming, he hurries to a hole, or gets under a limb, where the woodpecker cannot conveniently strike him. Sometimes Indians and even white men are glad to avail themselves of the woodpecker's stores as a protection against starvation.

The length of the bird is nine inches; the anterior part of the body above and the tail are black; the belly, rump, a patch on the forehead, and a collar on the neck, white; and the crown, and a short occipital crest, red. Dr. Newberry says: "This beautiful bird, the rival and representative of the red-headed woodpecker, [of the Atlantic slope of the Continent] is an inseparable element of the scenery of the Sacramento Valley. While we were encamped under the wide-spreading oaks of that region, I had a very good opportunity to study their habits, as they would come into the trees in the shade of which I was lying. They are not shy, and frequently came round in considerable numbers. Their manners are the very counterpart of the Eastern 'red-head,' and their rattling cry is not unlike his. Like the 'red-head,' I have seen two or three of them amuse themselves by playing 'hide and seek' around some trunk or branch; and like the 'red-head,' too, they delight to sit on the end of a dry limb, and fly off in circles for the insects which come near them."

Lewis's woodpecker is in color dark glossy green above and gray beneath, with dark-crimson patches on the sides of the head and belly. The feathers on the under part are bristle-like. It prefers an elevated home, and is found ten or twelve thousand feet above the sea.

318. *Humming-Birds.*—There are four humming-birds in California, all different from those found in the Atlantic States. The white-throated swift, a bird resembling the swallow, but smaller, is common in the Colorado Basin. We have a whip-poor-will, different from the one known in the Eastern States. Two night-hawks are found in our State, one of them appearing on this slope of the continent only in the vicinity of the Colorado, and on the other slope not extending far beyond

the [illegible] belted king-fisher (*Ceryle alcyon*) is at home in California, as well as in all other parts of the continent.

§ 319. *Fly-catchers.*—The family of fly-catchers, (*Colopteridæ*) which connects the non-melodious with the true singing birds, is represented in California by eleven species, most of which are not seen in the Atlantic States. They are small birds, from five to nine inches in length, and their colors are usually dull. Most of them have their upper mandible bent down abruptly at the tip; and they always have twelve feathers in the tail. One of the most common and the best-known of the fly-catchers is the bird called the "pewee."

§ 320. *Singers.*—The zoölogical sub-order called *Oscines*, or singers, has one hundred and nine species in our State, including two mocking-birds, three thrushes, two blue-birds, three robins, three larks, five black-birds, eleven finches, six wrens, six swallows, six warblers, one martin, one bunting, six titmouses, one snow-bird, two grosbeaks, one cow-bird, one oriole, one crow, three ravens, three jays, one water-ouzel, two magpies, and so on. Some of these birds are not called "singers" in common language, but they all belong to the *Oscines* sub-order, which is marked by a peculiar muscular apparatus for singing, composed of five pairs of muscles in the throat. Though there are many species of *Oscines* in the State, yet the birds are not so numerous, so melodious, nor are they heard so often, as the feathered songsters in the Eastern States. The traveler may proceed for days in the Sacramento Basin, during the summer season, without hearing more than a few chirps. Our singing-birds have been multiplying very rapidly of late, because of the settlement and cultivation of the land, whereby the supply of wholesome and palatable food is much increased, and their enemies the hawks are driven away. Most of our swallows, one mocking-bird, one black-bird, and one raven, found in California, are also seen east of the Mississippi; but all our jays, robins, blue-birds, and magpies, and our oriole, are of species not found in the Atlantic States. The majority of the *Oscines* indigenous on this Coast are unknown in the older States. Our mocking-birds are never domesticated, and are not to be compared to the mocking-bird of Virginia.

§ 321. *Scratchers.*—The ornithological order of *Rasores*, or scratchers, is represented in California by eleven species, namely: one pigeon, two doves, three grouse, two quails, one partridge, and one sand-hill crane. The pigeon, partridge, grouse, quails, and one of the doves, are specifically different from the birds known by the same name east of the Mississippi. The wild-turkey is not indigenous in our State.

The most abundant and prominent of our scratchers, the Californian quail, (*Lophortyx californicus*) is found in all the valleys of California and Oregon. Its breast and upper parts are lead-colored, with an olive-brown gloss on the back and wings; the chin and throat are black, with a white line running backward from the eye; the forehead is brownish-yellow; the belly is pale buff, with an orange-brown round spot in the middle, changing to white at the sides; the feathers on the back and sides have a central streak of white, and those on the top and sides of the neck have black edgings. The head bears a crest numbering from three to six feathers, usually five, about an inch and a half long. The shafts are bare, very slender, and, though all are in a straight line on the longitudinal medial line of the head, they are so near together as to look like but one shaft, more especially as the fine, fur-like bushes at their tops all combine to form a compact little plume. These feathers are usually erect, the plume leaning forward when the bird is trying to look its best in the presence of company; but when running about in the grass, and not thinking of its appearance, the crest is lowered, falling forward over the bill.

The Californian quail has two notes—the song and the call. The song of the Atlantic quail is in two notes—the well-known whistle, sounding like "Bob White." The song of the Californian quail has but one note, beginning like the "Bob," and ending like the "White" of its Eastern relative. The calls of the Atlantic and Pacific quails are nearly alike, and may be represented by the syllables "hi-re-he." "As a game-bird," says Dr. Newberry, "the Californian quail is inferior to the Eastern one, though perhaps of equal excellence for the table. It does not lie as well to the dog, and does not afford a good sport. It also takes a tree more readily than the Atlantic quail. Like its Eastern relative, the cock-bird is very fond of sitting on some stump or log projecting above the grass and weeds which conceal his mate and nest or brood, and especially in the early morning, uttering his peculiar cry."

The plumed quail, (*Oreortyx pictus*) likewise called the "mountain quail," while the *Lophortyx californicus* is often styled the "valley quail," is peculiar to this Coast, and is one of the most beautiful features of its ornithology. It is a partridge, ten inches long, very plump in shape, handsome in color, majestic in its bearing, and graceful in motion. Its head is surmounted by a crest of two straight feathers, three and a half inches long, which hang backward, one immediately over the other. The breast and neck are lead-colored, the upper parts generally olive brown; the throat and head, beneath the eyes, orange-chestnut; the abdomen white. There are numerous variegations of white, black, and minor shades, on the plumage, all contributing to heighten its beauty.

The mountain partridge lives in the hills and mountains, from the Tejon Pass to the Columbia River. Its song suggests the sound represented by the word "whoit," whistled fuller and louder than the song of the Californian quail. It roosts upon the ground; and if bushes be near, in which to hide, it will rather run than fly from its enemies. It seldom flies more than two hundred yards at a time. The cock is equally attentive with the hen to the young brood, which usually varies from eight to twelve in number. The families seem to be much attached to each other, and if they are scattered, they are very uneasy until all are collected again. In such cases the hunter can entice them to come to him by imitating the call of either old or young. They are easily domesticated —more readily than their brethren of the valley. The mountain partridge hates the quail, and when brought into its presence always attacks it; the smaller bird makes no resistance.

Gambel's quail (*Lorphortyx gambelli*) is a bird differing from the Californian quail only in having duller colors, and is perhaps specifically the same, the difference in color being a mere accident of climate. Occasionally white quails, very similar in form and size to the *Lophortyx californicus*, are found near Humboldt Bay.

The sage-cock, or cock of the plains, (*Centrocercus erophasianus*) the largest of the American grouse, often weighing five or six pounds, inhabits the dry plains in the vicinity of Pit River. It is sometimes twenty-nine inches long and forty-two inches across from tip to tip of outstretched wings. Its color above is variegated with black, brown, brownish-yellow, and whitish-yellow; its breast is white, its belly black. The male has bare, flame-colored patches of skin on the neck, which are ordinarily hidden by the feathers, but which are plainly visible when he struts about before the hen, with his neck puffed out like a pouter-pigeon's.

The sharp-tailed grouse (*Pediocœtes phasianellus*) is also found in the northeastern corner of the State. It is eighteen inches long, light brownish-yellow above, varied with black, and white beneath, the feathers on the breast and sides having brown marks shaped like a V. The tail is long and sharp, the central feathers and the others growing gradually shorter as they approach the sides; there are eighteen feathers in the tail.

The dusky grouse (*Tetrao obscurus*) inhabits the coniferous forests of the Sierra Nevada, in the northeastern part of the State. The cock, according to common report, is the handsomest of all the American grouse. It is twenty inches long, dark-brown above, mottled with lead-color, and lead-color beneath. There are twenty feathers in the tail, which is broadly tipped with a light slate-color.

The band-tailed pigeon, (*Columba fasciata*) the only wild pigeon found on the Pacific Coast, bears a strong resemblance, in form, size, and color, to its congener in the Atlantic States, and has similar habits; but is not numerous. Small flocks migrate through the State every spring and autumn, and some of them spend the summer here.

The white-winged dove (*Melophelia leucoptera*) has been seen in the southern part of the State, but is very rare. It has white spots on its wings, whence its common and technical names are derived.

The common dove (*Zenaidura carolinensis*) is found on the Pacific slope as well.

The sand-hill crane (*Grus canadensis*) are found from the meridian of Cincinnati to the Pacific, and are not rare in California. They spend the winters in our valleys, and in the spring migrate to the Klamath Lakes, and farther north, where they spend their summers and breed. Subsisting upon vegetable food exclusively, they are themselves good to eat, and are occasionally seen in the San Francisco market.

§ 322. *Waders.*—The order of waders (*Grallatores*) is represented in California by forty-one species of birds, namely: one crane, two herons, two bitterns, one fly-up-the-creek, one ibis, six plovers, one oyster-catcher, two turnstones, one avoiset, three phalaropes, one stillet, one willet, one godwit, one curlew, five snipes, five sand-pipers, one sanderling, three rails, and one coot. The oyster-catcher, one turnstone, one plover, and one heron, are the only species in the list not found east of the Mississippi, and none of them have such value or peculiarities as would give interest to a particular description of them.

§ 323. *Swimmers.*—California has sixty-six species of the order of swimmers (*Natatores*). Of these there are two swans, six geese, twenty-two ducks, four albatrosses, two petrels, seven gulls, four terns, three pelicans, three cormorants, four guillemots, one loon, and various miscellaneous species. One swan, all the albatrosses, five gulls, the two petrels, the loon, and one guillemot, are found only on this Coast.

The trumpeter-swan (*Cygnus buccinator*) is a very large bird, measuring five feet from the point of the bill to the end of the tail, and six feet across from tip to tip of the outstretched wings. The plumage is snowy white in color; its legs and bill are black. The name of "trumpeter" is given to it because of its clarion-like scream, which is heard as it flies. It frequents the lakes in the northern and northeastern parts of the State, and is sometimes seen in the rivers. It is a shy bird, and is rarely killed.

The American swan, found also on the Atlantic slope of the continent, is similar in appearance and size to the trumpeter, but lacks its loud voice, and is otherwise distinguishable from it chiefly by having an orange-colored spot on its bill, in front of the eye, whereas the bill of the *Cygnus buccinator* is entirely black.

Wild geese are very abundant in California during the spring and fall, when they pass through on their migrations. Among them are the Canada goose, (*Bernicla canadensis*) the snow-goose, (*Anser hyperboreus*) the white-footed goose, or "speckled belly," (*Anser erythropus*) Hutchings' goose (*Bernicla hutchinsii*) and the black brandt, (*Bernicla nigricans*). Hutchings' goose is more abundant than any of the others. Some of them, while in the State, get all their food in the tules; others in the spring resort to the fields of young grain, where they pasture. Dr. Newberry says: "I was much interested in noticing the perfect harmony of intercourse which seemed to exist among the smaller species. They intermingled freely while feeding, and when alarmed arose without separation; and I have seen a triangle flying steadily high over my head, composed of individuals of three species, each plainly distinguishable by its plumage, but each holding its place in the geometrical figure, as though it was composed of entirely homogeneous material; perhaps unequal members of the darker species, with three, four, or more pure snow-white geese flying together somewhere in the converging lines."

Among the ducks of California are the mallard and canvas-back. The meat of the latter has not so fine a flavor as in the Eastern States, probably because it does not here find the wild celery upon which it feeds along the streams of the middle States.

Many of the geese and ducks pass the winter in California, where they find an abundance of food in the grain-fields and tules.

The murre, or foolish guillemot, (*Uria ringvin*) is similar to the gulls, seventeen inches long, dark-brown above and white beneath, with transverse stripes of ashy-brown on its sides. Its throat is brown in summer and white in winter. It frequents the islands along the coast, and lays its eggs there on the bare ground or rocks. These eggs are wonderfully irregular in form, size, and color, but are generally about three and a half inches long, sea-green in color, with dark-brown spots of angular shapes on them. Quantities of these eggs are obtained every year at the Farallones, and are sold in the San Francisco market at about half the price of hens' eggs per dozen, or, if taken by weight, at one-fourth. Their taste, however, is rank, and they are not used by those who can afford to buy hens' eggs.

Dr. Heermann says: " At one o'clock every day during the egg season, Sundays and Thursdays excepted, (this is to give the birds some little respite) the egg-hunters meet on the south side of the island. The roll is called, to see that all are present, that each one may have an equal chance in gathering the spoil. The signal is given, every man starting off at a full run for the most productive egging-grounds. The gulls (*Larus occidentalis*, Western gull) understanding, apparently, what is about to occur, are on the alert, hovering overhead, and awaiting only the advance of the party. The men rush eagerly into the rookeries; the affrighted murres have scarcely risen from their nests, before the gull, with remarkable instinct, not to say almost reason, flying but a few paces ahead of the hunter, alights on the ground, tapping such eggs as the short time will allow, before the egger comes up with him. The broken eggs are passed by the men, who remove only those which are sound. The gull, then returning to the field of its exploits, procures a plentiful supply of its favorite food."

A diver, found in the bays and rivers of the State, gray on the back and white below, is valuable for its skin, which is stretched and dried with the feathers on, and then used for muffs and collars. The meat is so fishy and tough, that it is not fit for the table.

§ 324. *Fishes.*—The fishes of the coast and rivers of California are all different from those of the Atlantic side of the continent, with the exception, perhaps, of one species of the halibut. The cod and shad, two of the most important fishes of the sea of the Eastern shore, and the lobster among crustaceans, are here wanting, as also the cat-fish kind in the rivers. Otherwise, our waters are probably as rich in game for the fisherman as those of any country.

§ 325. *Salmon.*—The most important fish of California is the quinnat salmon, (*Salmo quinnat*) a species found from Point Conception to the Columbia River. Its color above is olivaceous brown, changing to salmon-color beneath. The largest one ever caught weighed sixty-two pounds; the common size is from ten to thirty pounds. The salmon are born in the rivers, but go down to the sea, where they spend part of every year. They commence to enter the Bay of San Francisco in November, and continue to come in for three or four months. They ascend the Sacramento and San Joaquin

Rivers and some [illegible] their small [illegible] tributaries, deposit their spawn, and in June go out to sea again. They come in lean and go out lean, but in the late winter and early spring they are fat. There are two common popular errors: that the salmon do not eat after leaving the sea, and that they never get back alive. The former error is owing to the fact that no large articles of food are found in its stomach; and the latter to the fact that when going out all are lean, and that many are found dead along the banks of salmon-streams. But the salmon find their chief food in minute animalculæ, and not in fish, for catching which they seem to be so well fitted, with their large mouths and sharp teeth. It is well known that the salmon bite like trout, and furnish excellent sport in clear water to the skillful fisherman with the fly. They dislike the mud with which the streams emptying into San Francisco Bay are filled by the miners, and therefore do not go far from the sea or ascend the small tributaries; but elsewhere they ascend every little brook, up to points where there is scarcely enough water for them to swim; and in these expeditions they are so much exhausted and bruised that they soon die; but the number thus killed is as nothing compared with those which go out to sea again. The female salmon, having found a suitable place, uses her nose to dig a trench in the sand about six feet long, a foot wide, and three inches deep, and having deposited her spawn in it, throws a little sand over it with her tail, and departs, leaving her eggs to be hatched and the offspring to be fed as best they can. In the month of May the young salmon are found on their way to the sea, from three to six inches long. It is supposed that the salmon always return to the river in which they were born; so that the salmon born in the Klamath River never enter San Francisco Bay, nor do those born in the Sacramento and San Joaquin Rivers ever enter Humboldt Bay. Although the season in which salmon are abundant in the rivers extends from November to June, yet some of them are found in the streams of California at all seasons, and they can be had fresh in the San Francisco market every day in the year.

The quinnat is the chief salmon of all the streams and bays of California, but Gairdner's salmon (*Fario gairdneri*) is found in the Klamath River, and the *stellatus* salmon in Humboldt Bay and its tributaries. Gairdner's salmon has a silvery-gray back, silvery sides, and a yellowish-white belly. The body has numerous indistinct, blackish spots. The stellatus salmon is light-olive in the back, yellowish-white on the belly, and rarely exceeds two or three pounds in weight.

§ 326. *Halibut.*—There are two species of halibut on the coast of California, the Californian (*Hippoglossus californicus*) and the common (*Hippoglossus vulgaris*). There is some doubt whether the latter species is properly named; if it be, then we have one species of fish found on the Atlantic coast. The Californian halibut is a slender fish, weighing at the largest twenty-five pounds, in color grayish-brown above and white below. The halibut prefer a colder climate, and are not sufficiently abundant in this latitude to sustain a special fishery; but a few are in our market throughout the year. They live in deep water, and in places where the bottom is rocky. They eat little fish and shell-fish, and bite readily at the hook. Their meat is very delicate.

§ 327. *Turbot.*—The turbot (*Pleuronychthys rugosus*) is the only large flat-fish, except the halibut, found along our shore. It inhabits deep waters and rocky bottoms, eats fish, and bites readily at the hook, is one of the best fish in our market, and sometimes grows to weigh twenty pounds, but the common size is from three to ten pounds.

§ 328. *Sole.*—We have four species of small flat-fish, commonly called soles (*Psettichthys sordidus*, *Psettichthys melanostictus*, *Parophrys vetulus*, and *Platessa bilineata*). They are so much alike, that they are not distinguished from one another by fishermen generally. The *Platessa bilineata* is the largest, sometimes weighing two pounds; the others rarely exceed one pound. They frequent the shallow waters of the Bay of San Francisco, and are caught abundantly in nets at all seasons of the year. The flat-fishes do not bury themselves in the mud here through the winter, as they do in the North Atlantic. The soles feed on crustacea, little fishes, and marine animaculæ.

§ 329. *Mackerel.*—The mackerel, (*Scomber diego*) found north of Point Conception, is good, but not more than half as large as the Atlantic mackerel, rarely exceeding ten inches in length. It lies near the surface of the water at sea, and is not fond of entering bays, or going very near the shore. Like its Eastern congener, it bites readily at any white rag or shining white substance jerked through the water.

§ 330. *Rock-Fish.*—The rock-fish furnish the main supply of fish in the San Francisco market. All belong to the genus *Sebastes*, of which there are eight species, the most important being the red, (*rosaceus*) black, (*melanops*) and wharf rock-fish (*auriculatus*). The red rock-fish grows to weigh twenty pounds; the other species rarely exceed four or five. The wharf rock-fish is the only one caught in the bay; the others live out at sea, in deep water and on rocky bottoms; they eat crabs and shell-fish, and bite freely at hooks. They are always in market, and their meat is excellent at all seasons.

§ 331. *Sturgeon.*—The sturgeon is represented in this State by three species, the only important one being the Californian sturgeon, which sometimes reaches a length of nine feet, with a weight of 300 pounds. It is a sea-fish, but spawns in fresh water, and it is caught in the Bay of San Francisco and tributaries at all seasons of the year; whereas in the Eastern States there are seasons for sturgeon in the market, as there are for beans and peas.

The sturgeon eats the slimy matter, both animal and vegetable, at the bottom of the sea. It never bites, its mouth being circular in form, and fitted only for sucking. It has a habit of shooting up from the bottom and springing out of water, and then falling flat upon its belly, making a loud splash—very different from the porpoise, which also darts out of the water, but always strikes head first, making little noise. Some ichthyologists suppose that the object of the sturgeon in thus falling on the water is to free itself from parasites; others, that it is merely a kind of play. The spawning-season is not known precisely, but it is probably from December to May. The meat of the sturgeon is coarse, and in the market is worth only about one-fourth or one-sixth of that of the better table fishes; but the sturgeon fishery is profitable, because of the abundance and large size of the fish.

§ 332. *Jewfish.*—The Jewfish, (*Stereolepis gigas*) one of the largest scale-fishes, weighing sometimes five hundred pounds—is abundant south of Point Conception, and rarely straggles as far north as San Francisco Bay. Only two have been caught near the Golden Gate, and one of them filled the city with wonder. It is a bottom fish, living in deep and shoal water, and frequenting lagoons and kelp. It often comes to the surface, and according to report, goes to sleep there. It bites readily at the hook, and may be taken with harpoons. The meat is very good.

§ 333. *Sunfish.*—The sunfish, (*Orthagoriscus analis*) though not abundant, is frequently found south of Point Conception, where it is seen floating on the surface, in accordance with the habits of the genus everywhere. Its form suggests the idea that the body has been cut off near the broadest part, and the tail sewed on, and its usual weight ranges from fifty to one hundred pounds.

§ 334. *Greenfish.*—The greenfish, (*Opplomona pantherina*) generally called cod in the San Francisco market, but having no relationship to the true cod, is abundant along the coast. It grows to about two feet in length. The meat is coarse, and green in color; and the fish has little commercial value.

§ 335. *Sea-Bass.*—The sea-bass (*Johnius nobilis*) is a plain, oval fish, bluish-gray in color above, silvery below, weighing from fifteen to forty pounds. It is closely related to the weak-fish of the New York market. The meat is white and delicate, and always commands a high price in the market. It is a surface fish, and sometimes enters the bays, but it is not abundant anywhere. It is caught from March to November.

§ 336. *Sheepshead.*—The Californian sheepshead (*Labrus pulcher*) is a black fish, with a broad, bright-red band surrounding the body, and weighs from one to twelve pounds. It has white, broad, projecting teeth, like those of a sheep. It has no relationship to the Atlantic sheepshead, but is a congener of the black-fish of the New York market. The meat has a very fine flavor when fresh, but loses its delicacy after being dead a day or two. It is found south of Point Conception, on rocky and kelpy bottoms, from April to October. Its food is chiefly shell-fish.

§ 337. *Smelts.*—We have four species of fish called smelts (*Atherniopsis californiensis*, *Atherniopsis affinis*, *Osmerus preciosus*, and *Osmerus similis*). The *Atherniopses* are not true smelts, but belong to the same genus with the sanderlings of the Atlantic, which last are thrown away, or used only as bait; whereas our *Atherniopses* are valuable fishes. The *Atherniopsis californiensis* forms the great bulk of the smelts in our market. It is the largest of the Pacific smelts, sometimes reaching a length of fifteen inches, and a pound in weight. The *Osmerus* species are small. All of them have bright silver bands along their sides. The smelts are more abundant here than on the Eastern Coast, and are the best of our small fishes. They are caught at all seasons of the year; in the bays with nets—never at sea, or with hooks.

§ 338. *Anchovy.*—There are two anchovies (*Engraulis mordax* and *Engraulis nanus*) on the coast of California. They are so nearly alike, that they are undistinguishable except by ichthyologists. Both are small, from four to six inches long, very delicate in flavor, but very bony. They are fully equal to the European anchovy for the table. They feed on minute animalculæ, go in shoals, and are caught with nets in the bays at all seasons of the year.

§ 339. *Sardine and Herring.*—The sardine (*Meletta cerulea*) is abundant from Humboldt Bay to San Diego. It grows to a length of eight or nine inches, and is therefore much larger than the Mediterranean sardine, to which it is fully equal in flavor. It is found along the coast from April to October, and is caught in the bays with nets.

The herring (*Clupea mirabilis*) is not so abundant as the Atlantic species, nor so large, but is equal in flavor. It comes in the spring, and goes in the autumn.

§ 340. *Viviparous Fishes.*—The viviparous or embiotocoid fishes of this Coast are a peculiar feature of its ichthyology. They constitute, perhaps, the most remarkable natural group of fishes in the world, and their discovery caused a marked sensation among zoölogists. Other viviparous fishes have been previously known, but their young are brought forth in a very immature condition; whereas the little embiotocoid fishes are born with a fullness of development similar to that of warm-blooded animals, and the moment after they leave the mother they are seen swimming about and taking care of themselves. There are seventeen or eighteen species belonging to the several genera, among which the *embiotoca* and *holconotis* are prominent. All are marine fishes save one, which is found in fresh water. They weigh from half a pound to three pounds, and most of them are grayish brown above and silvery beneath. They are abundant in the market at all seasons of the year, and are called " perch " by the fishermen, though they bear no relationship to the true perch. The meat is not good. The young are born from April to August.

§ 341. *Flying-Fish.*—The Californian flying-fish, (*Exocetus californicus*) found off our coast from Santa Cruz to San

Diego, grows to be about sixteen inches long, with flying fins nine inches long. These start out back of the gills, and when folded down against the body, reach nearly to the tail. It can fly from 200 to 400 yards, does not reach a height of more than 25 feet, nor stay out of water more than a minute at a time. It is seldom caught, save when it flies on a vessel. The meat is palatable.

§ 342. *Fresh-water Fishes.*—Among the fresh-water fishes the most important is the brook-trout, (*Salar iridea*) which is found in all the mountain streams of the State, and offers fine sport for fly-fishing. It not unfrequently grows to weigh two pounds, and if report is to be believed, sometimes reaches ten and twelve pounds. In appearance and flavor it is similar to the trout of other countries.

A fish called the salmon-trout, (*Ptychocheilus grandis*) but not related to the salmon, the trout, or the salmon-trout, found in all the large rivers and lakes of California, weighing 30 pounds at its largest size, is caught with the hook or net in winter. The meat is insipid. It lives on shell-fish, which it crushes in its throat, where its teeth are.

A chub, (*Tygoma crassicauda*) and two suckers, (*Catostomus labiatus* and *Catostomus occidentalis*) never weighing more than three pounds, are also found in our rivers. They are not valuable.

§ 343. *Reptiles.*—The snakes of California are not large, numerous, or remarkable. Only one of them, the rattlesnake, is poisonous.

The scorpion is found in the warmer portions of the State, but is not abundant.

Tarantulas are common in Calaveras, Mariposa, Fresno, and Tulare Counties. They belong to the same genus with the spiders, but the body grows to be three inches long and an inch wide, and the entire length from end to end of outstretched legs is five inches. The body and legs are covered with silky, brown hair. The tarantula eats little insects of various kinds, but, unlike most other spiders, has no net. It lives in a hole in the ground, not much larger than itself when pressed into the smallest compass, and the hole is covered by a little door on a hinge, which closes by its own weight, or by a spring. In the top of the door are several little holes, into which the tarantula can insert its claws when it wishes to enter; and so quick are its motions when terrified, that it often disappears suddenly under the eyes of men pursuing it, and they have great difficulty in finding its hiding-place. The door fits tightly, and is larger on the outside, so that it never sticks fast.

The bite of the tarantula is poisonous, but not fatal—or at least has never, so far as I know, proved fatal in California. It rarely bites men, and generally flees when it discovers their approach. The tarantulas have dangerous enemies in several species of wasps, the females of which kill them by thrusting eggs into their bodies. When the larvæ of the wasp are hatched, they make food of the carcass. So soon as the tarantula dies, the wasp drags it to her hole, usually the deserted burrow of a spermophile, where she may collect twenty or thirty dead tarantulas in one season. There are three different species of these wasps: one kind is blue, another yellow. Sometimes the wasp darts down repeatedly upon the tarantula, and does not touch him except with her egg-planter, depositing an egg at every thrust. On other occasions the two grapple, and the wasp continues to insert her eggs until the tarantula dies. The editor of a newspaper of Mariposa thus describes the killing of a tarantula: "Some of our readers may have heard of the tenacity with which the venomous tarantula is pursued by an inveterate enemy, in the form of a huge wasp—invariably resulting in the defeat and death of the former. We were an eye-witness to one of these conflicts last week, while on a ramble among the adjacent hills. This is the season when the poisonous tarantula leaves his well-fashioned abode to perambulate the dusty roads and smooth paths so often trod by the industrious miners; and about their haunts a dozen or more may be seen any day, of this hideous enlargement of the spider-race, within a circuit of a few yards, leisurely wending their way along the roads and byways. Often have we marked, with attentive curiosity, his awkward gait while lifting his long, unwieldy legs above the short blades of grass, and wondered for what uses and purposes this ugly little monster was placed upon this beautiful globe. While attentively watching the motions of one of these insects during our walk, we were much surprised to see the object of our attraction suddenly stop short in his wanderings and raise itself up to its full height, as though watching the coming of some unwelcome visitor. We at first supposed that it had just espied us, and was expecting danger at our hands; but upon our retreating a few steps, he quickly crouched behind a tuft of dried grass, and remaining very quiet, seemed to make himself as small as possible. A slight buzzing was heard in the air, and in a moment a wasp passed near, hovering on the wing over his trembling victim, the much-dreaded tarantula. Like some bird of prey, the wasp remained thus poised for a moment, and then, quick as thought, darted down upon the enemy, and stung him many times with great rapidity. The tarantula, smarting under the pain, began a retreat, with all the speed of which he was capable; but the wasp hung over him with wonderful tenacity, and again and again struck him with his venomous sting. Gradually the flight of the tarantula became slower and more irregular, and at length, under the repeated thrusts of his conqueror, he died, biting the grass with his terrible fangs."

Several species of small spiders, which live in a dwelling like those of the tarantula, and therefore called "trap-door" spiders, are found in California, and one kind has many representatives on Telegraph Hill, in San Francisco.

Locusts and grasshoppers are abundant in the valleys; mosquitoes in the tules, and along the streams in the Sacramento Basin; and flies everywhere.

§ 344. *Honey-Dew Aphis.*—Among the noteworthy insects of the State is one which secretes a sweet liquid called "honey-dew," and deposits it on trees. It is transparent, thick like honey, and sweet, sometimes with a bitter after-taste, but more frequently having a flavor like parched corn. The leaves and twigs are covered with it, the deposit usually being nearly even, occasionally in spots or drops. The honey-dew is more frequently found on oak-trees than on any other tree or bush; and oftener in dry seasons, and remote from the coast, than in wet weather or within reach of the sea-fogs. A kind of molasses may be made by breaking off the twigs covered with the secretion, and boiling them in water. Honey-dew is found in most countries where the soil is barren or the climate dry, and may be the same with the manna of the Hebrews.

§ 345. *Shell-Fish*—We have five species of shell-fish valuable for the table: one oyster, two mussels, one cockle, and a soft-shelled clam. The oysters are small, not finely-flavored, nor abundant.

The abelone or aulone (*Haliotis*) is found as far north as Point Reyes, and abounds south of Point Conception. It is a mollusk with one shell, from five to seven inches across; beautifully iridescent, and is much used in the arts for buttons, knife-handles, and inlaying. Many vessels are engaged in fishing for them. The abelones stick to the rocks and to each other, collecting in some places in masses two feet thick; the fishermen break them off from the rocks with a spade. When the abelones do not suspect danger, they loosen their hold and raise their shells from the rock, and then the fisherman may easily thrust his spade down along the surface of the stone; but if he alarms the abelone beforehand, he finds the shells fastened down to the rock with great power, and all the strength of a man is scarcely sufficient to pry one of them off. The meat of the abelone is eaten by the Chinese, who dry it into a substance resembling a colt's hoof in color, and hardness, and shape.

There are two cowries on the coast of California; one shell of the harp (*harpa*) genus, so called because ribs suggesting the strings of a harp run down over its sides from its spiral crown; four species of the olive, (*oliva*) which resemble the fruit of the same in size, shape, and color; one species of the *voluta*, (similar to the harp, but without its ribs); twelve species of the limpet, and two species of the bivalve pilgrim shell, (*pecten*) used sometimes by ladies for pincushions. All these contribute to make the beaches in the southern part of the State attractive.

We have no lobster, but a prawn, (*Palinuris*) very similar to the lobster in size, color, flavor, habits, and general appearance, except that it lacks the large claws. Crabs are abundant.

The shrimp (*Crangon franciscorum*) is found in the bays of California, and was very abundant a few years ago; but lately it is getting scarce, at least in San Francisco Bay.

Coral grows off the coast at various points, as far north as the Farallones; and sponge is found from Santa Barbara southward in small quantities.

The climate is so dry in many parts of the State that land mollusks are comparatively rare, and some of the snails adapt themselves to the circumstances by estivating, or remaining torpid in the hot dry months, as other animals hybernate in very cold weather farther north.

A sea-egg, (*Echinus*) sea-urchin, or sea-porcupine, as it is variously called, has a shell nearly spherical in shape, and about three inches in diameter, with spines three inches long and an eighth of an inch in diameter. The flesh is palatable, and the spines are sometimes used as slate-pencils.

§ 346. *Ship-Worm.*—The ship-worm (*Teredo navalis*) is probably not indigenous in the waters of California, but it abounds in our bays, and does great damage. It is a worm of soft flesh, but is provided with bone-like cutters, or teeth, with which it bores through hard wood, sometimes making a hole a third of an inch in diameter. It usually follows the grain, lives only in wood below high tide in salt water, and never descends far below low tide. The mixture of fresh water with that from the sea diminishes the activity of the teredo, and in seasons of drought they do comparatively much injury in San Francisco Bay, but little after abundant rains, continuing late into the summer. The eggs are thrown out upon the water and carried about by the current. If they stick upon wood, they hatch and bore in, and once inside they never leave it till it is converted into honey-comb. Piles fifteen inches through, unless covered with metal or filled with some substance (creosote, for instance) offensive to the ship-worm, are usually rendered worthless in five years, and sometimes in three.

Another harbor pest is the gribble, (*Limnoria*) a worm about one-tenth of an inch long, which lives in wood exposed to sea water, between high and low tide, and unlike the teredo, eats across the grain, and comes out to the surface.

CHAPTER XIII.

LAW.

§ 347. *Constitution.*—California is a State in the American Union, nominally sovereign, but subject to the superior authority of Congress over commerce, naturalization, coinage, currency, foreign relations, and the army and navy. The executive officers of State are elected by the people, a year before the Presidential election, and hold office for four years. The legislative power of the State is held by a Senate, of forty members, who hold office four years, (half being elected every alternate year) and an Assembly of eighty members, all of whom are elected every odd year. The Legislature holds a regular session of four months once in two years, commencing in December of every odd year. The members generally are men with little experience in business, and little character. Gross corruption is common among them.

The Supreme Court of California has five judges, who are elected by the people, and who hold their office for a term of ten years. It has no original jurisdiction, and devotes itself to the decision of law questions brought up on appeal from the District Courts, of which there are twenty. The District Judges are elected by the people for six years, and have original jurisdiction in cases of mandamus, injunction, land titles, divorces, suits for more than $300 in money, murder, and arson that might cause death. Crimes are tried in the County Courts.

Either party can have a jury in any case, and it may be waived in civil suits or trials for misdemeanor, but not in felonies. The judges of California have, as a class, been learned, able, and upright men, and have been far superior to the legislative and executive officers in learning, capacity, and integrity.

The county officers are mostly elected for terms of two or four years, and they are generally chosen on account of service rendered to the successful party. The term of service being brief, reëlection doubtful, ejection for incompetency unheard of, and punishment for malfeasance—notwithstanding the frequency of the offense—very rare, there is no sufficient motive to stimulate the officials to study their duties, or to comply very strictly with them, so far as known.

The Federal as well as the State offices are the subjects of scramble once in four years, or oftener, and success is not determined by the public interests. The partisan system of the United States is corrupt and corrupting everywhere, and in few States has its influence been more pernicious than here. San Francisco has fortunately repudiated it, and most of her officials have been chosen in defiance of the Republican and Democratic wire-workers, and her administration has been in many respects better than that of any other American city.

§ 348. *Marriage.* Marriage, by the law of California, is a civil contract. No ceremonial form, publication of banns, consent of parents, blessing of priest, seal of magistrate, or presence of witness, is necessary to give validity to the contract, if the parties be adults. Although the law does not require a ceremony, yet custom does, and the priests and preachers are usually called in to perform it. Divorce may be granted for adultery, habitual intemperance, extreme cruelty, desertion for two years, sentence to the State prison for two years or more, and impotence. There has been much complaint that the statute renders divorce too easy, but the general opinion of California is favorable to the law as it is.

§ 349. *Inheritance.*—The husband can convey his separate property and one-half of the common property by will, at his pleasure. If, however, he gives little or nothing to his children or wife, the jury in the Probate Court may declare him insane, and set the will aside. If he died without a will, his widow takes one-half if there be no child, or only one child, and one-third if there be two or more children. If there be no child, half shall go to his father, and if there be no father living, then to the mother, brothers, and sisters in equal shares, or the entire half to one if only one be alive. If the intestate had a child who died before him and left children, they get the share of their parent. The children inherit equally when they inherit anything. No distinction is made on account of age or sex. If the intestate leave no wife or child, all goes to the father, and if he leave no child, parent, brother, or sister, all goes to the wife. In case of the death of the wife without a will, her property descends in the same manner to her husband, children, and relatives.

No legacy to a corporation is valid, unless the corporation be expressly authorized by its charter, or by statute to take bequests.

§ 350. *Conveyance of Land.*—Real estate is conveyed by "grant." The Statute gives the following as a valid form:

I, A—— B——, grant to C—— D—— all that real property situated in ——County, State of California, bounded as follows ——.

Witness my hand this —— day of —— 18—.

A. B.

No seal is necessary, and a fee-simple title passes, unless a limitation be expressed. Under the English law, if the conveyance were made to "John Smith," simply, the title reverted to the grantor when Smith died; and to get a fee-simple the conveyance was made to "John Smith and his heirs."

The use of the word "grant" in a fee-simple conveyance in

California, implies and covenants that the grantor has not previously conveyed his title or any part of it to any other person, or encumbered it in any way; in other words, he covenants that the title is as good as when he got it. The grant title is equivalent to the "bargain and sale" title, which was in general use before 1873. Warranty conveyances have never been extensively used in California.

§ 351. *Tenure of Land.*—Most of the land in California is owned by the Federal Government, which acquired it from Mexico by treaty. This Federal land lies in the mineral regions, and in all the unsettled districts of the State. Most of it has been surveyed, and with the exception of land in the mineral districts, is offered to homestead settlers, in lots of forty acres, or tracts of any size of which forty is a multiple, not exceeding 160 acres.

Most of the land held in private ownership in the State, is under grants made by Mexico previous to 1846. Of these grants there are eight hundred and thirteen, covering a total of 9,828,181 acres. Of these claims, about one hundred and fifty, covering about 3,000,000 acres, have been finally rejected, and some are as yet undecided. The grants were for large tracts called ranchos, intended to be used chiefly or exclusively for pasturage, and the average size was about 12,000 acres, or three square leagues. The grants were made, not by the acre or by the mile, but by the square league, containing 4,438 acres and a fraction, or, to be precise, 4,438.683 acres. Every ranch had its name, for it was a kind of principality; and these names have in many cases been transferred to towns and townships under the American dominion.

The common tenure of land in California is fee-simple. Such conditional tenures as are common in Europe are very rare here, and many of them are prohibited by our laws. We have few life estates, nor is any lease or limited conveyance of land good for a longer period than ten years, unless it be a town lot, and then the limit is twenty years. All conveyances of real estate are placed upon record in a Government office, and without such record they are not valid as against persons not parties to the conveyance, and not informed of its existence.

§ 352. *Separate Property.*—The property owned by either the husband or wife before marriage, and by gift, bequest, or inheritance after marriage, belongs to each separately; and the property acquired after marriage by other means than gift, bequest, or inheritance, is common property, belonging in equal shares to both. The husband, however, has sole control of it. The wife has no right of dower, and the husband has sole control of the common property, and may sell, without the consent of the wife, any of it except the homestead; a deed or mortgage for which, without her signature and seal, is absolutely void. The husband cannot convey his interest unless she conveys her interest at the same time. "The wife may, without the consent of her husband, convey her separate property." That is the language of the Code, and it implies that she can lease, repair, give valid receipts for rent, bring suit for the protection of her title, and do other acts that require less power than does a sale.

§ 353. *Mining Claims.*—All valuable mineral deposits on land belonging to the United States, surveyed or unsurveyed, are free and open to exploration and working without charge, and also to purchase by any citizen, or any foreigner who has declared his intention to become a citizen. Aliens have no right to take up mining claims or to purchase land from the Government, but they can hold by valid title when they purchase from citizens. Mining claims shall be governed by the conditions prescribed in State or Territorial legislation, or if there be none, then of the regulations adopted by the miners of the district; but no claim must exceed fifteen hundred feet in length, whether taken up by a person or a company, nor shall the width be more than three hundred feet, or less than twenty-five feet on each side of any lode.

§ 354. *Titles to Mines.*—Any person or company holding a valid claim to a lode mine, after spending $500 in working it, may obtain a perfect title to it, by patent, from the Federal Land Office, on paying for the survey and for the land at the rate of $5 per acre. The survey should not follow the rectangular lines adopted in the agricultural districts, and should include only the claim. Titles for tracts not exceeding five acres, used for mills or dumps, may also be obtained by patent. Titles for placers may be obtained in rectangular tracts not less than ten acres in size, conforming to the general system of surveys; and no patent shall cover more than 160 acres of mineral land. The patent issues only to the holder of a valid placer mining claim, who has spent $500 in working it, and he must pay $2.50 an acre for it.

Grants of land by Mexico did not carry any title to the minerals under the law of that country; but the patents based on Mexican grants issued by the United States convey the absolute ownership of all the minerals.

Title to water can be acquired by appropriation to a useful purpose, at least of all the water on land belonging to the Federal Government.

§ 355. *Laws Favorable to Debtors.*—The laws of California relating to the collection of debts are very favorable to the debtor. His homestead, the property owned by his wife previous to marriage, that given to her afterward, his household furniture to the value of two hundred dollars, his tools, if a mechanic, his horse and wagon, if a teamster, and his library, if a lawyer, are exempt from execution. A married man, a widow or widower with children, or any head of a family, is entitled to a homestead worth five thousand dollars, secure against creditors. An unmarried person may have a homestead worth one thousand dollars. Such laws may prevent much oppression of poor people, but they also protect and encourage much rascality. A man may own a homestead worth five thousand dollars, and that may include a very elegant dwelling. His household furniture, worth as much more, may have been presented by some friend to his wife after marriage. She may have a separate estate of one hundred thousand dollars, and may derive an annual income of ten or twenty thousand dollars from it, and both may live in an extravagant style, and yet creditors have no hold upon him whatever. There is no imprisonment for debt, except in cases of fraud, which it is almost impossible to prove. In many ways the debtor is fenced about, so that the laws seem to have been devised by men who had had experience in swindling creditors, and wished to secure themselves against trouble in the future.

The laws of California, like the customs and trade, do not favor the perpetuation of wealth in families. There is no right of primogeniture. All children inherit equally. The eldest son gets no more than the youngest. Public opinion runs with the law. The rich man who expressed an intention to give all his property to his eldest son, merely because of his seniority, would be hated. Entails are forbidden. How different is all this from the state of affairs in Europe! There, at least in some countries, all the property goes to the eldest son; property is entailed in the family for many generations; the debtor is subject to imprisonment; there is no release for insolvents; the property of the woman is by marriage vested absolutely in the husband, and does not revert by inheritance to her blood relatives by her death; the limitations for commencing law-suits are very long, and sales, if not made at the market price, or contracts, if made so that one party appears to have obtained an advantage of the other, may be rescinded. The habits and opinions of the people give strength to their laws; and wealth once in a family is almost as certain to be transmitted through many generations by inheritance in Europe, as its loss in the second or third generation is certain in the new States of America.

CHAPTER XIV.

TOPOGRAPHICAL NAMES.

§ 356. *New Names.*—The topographical names of California differ much from those of other States in the Union, where there is a disagreeable repetition of familiar names. Our people have not attempted to immortalize Franklin, Jefferson, Madison, Adams, Henry, Randolph, Clay, Cass, Benton, Webster, Taylor, Fillmore, Polk, Pierce, or Buchanan, by affixing their tiresome patronymics to counties or towns. All our prominent places are designated by titles comparatively new to the English language.

The topographical names of the State are derived from three languages—Spanish, English, and Indian. The names along the southern coast and about the Bay of San Francisco—districts which were populated by the Spaniards long before the Americans came to the country—are chiefly Spanish. The larger rivers in the Sacramento basin were known to the Spaniards, and were named by them previous to 1846. The mining districts of the Sierra Nevada and the Klamath basin, and the coast north of 40°, were first explored and settled by the Americans, and therefore the names are of English origin. The Indian names are numerous.

§ 357. *Sacred Spanish Names.*—The Spanish names may be divided into the sacred and profane. The first Spanish settlers were Catholic missionaries, in whose almanac every day is named after some saint, and in whose faith the saints were but little below divinity. It was customary for them to keep the saints constantly in mind, and when they came to a strange place, to name it after the saint upon whose day they had reached it. Thus it is that nearly all the settlements made by or under the missionaries are sanctified.

The male saints have "San," the females "Santa" to precede their Christian names, as in English we have "Saint." Some uneducated Americans corrupt the "San" or "Santa" before certain Spanish names into "Saint," and say "Saint Francisco." But the more intelligent Americans adhere to the Spanish spelling, and generally to the pronunciation. The "a" in "San," however, is usually pronounced like the "a" in the English "fat," while the Spanish sound is more like that in "far," and the last "s" in "San José" and "Santa Rosa," is ordinarily given like an English "z" rather than a Spanish "s."

The Missions were all named from saints or sacred dogmas. There are San Miguel, San Gabriel, and San Rafael (from the three archangels, Michael, Gabriel, and Raphael), San Juan Bautista and San Juan Capistrano (St. John the Baptist and St. John of Capistrano), San Francisco de Assisi and San Francisco de Solano, San Luis Rey and San Luis Obispo (St. Louis the king and St. Louis the bishop), San Carlos, Santa Clara, Santa Barbara, San José (St. Joseph), Santa Inez Virgen y Martyr (St. Inez the virgin and martyr), San Antonio de Padua (St. Anthony), San Fernando Rey (St. Ferdinand the king), San Buenaventura, La Purisima Concepcion (the Most Pure Conception), Nuestra Señora de Soledad (our Lady of Solitude), San Diego (St. James), and Santa Cruz (the Holy Cross).

Among the saints whose names are applied to places not missions, are San Pedro (Peter), San Pablo (Paul), San Mateo (Matthew), San Andres (Andrew), San Marcos (Mark), San Simeon, San Joaquin (Joachim), San Nicolas, San Clemente, San Lorenzo (Lawrence), San Leandro (Leander), San Pascual, San Ramon, San Felipe (Philip), San Cayetano (Cayetan), Santa Marta (Martha), Santa Maria, Santa Paula (Pauline), Santa Rosa, Santa Isabel, Santa Margarita, Santa Catalina, Santa Susana, Santa Lucia, and Santa Gertrudis. Other Spanish sacred names, not derived from saints, are Trinidad (Trinity), Sacramento (Sacrament), Jesus Maria (Jesus the Son of Mary), and Nuestra Señora La Reina de los Angeles (Our Lady the Queen of the Angels).

§ 358. *Profane Spanish Names.*—Among the Spanish profane names are Agua Fria (cold water), Agua Caliente (hot water, or warm spring), Vallecito (little valley), Esperanza (hope), Campo Seco (dry field), Garrote, Hornitos (little oven), Salinas (salt places), Alameda (an avenue of elms or cottonwood trees), Saucelito (a little clump of willows, more properly spelled Sauzalito), Laguna Seca (dry lagoon), Ciénega (puddle), Merced (mercy), Buena Vista (good view), Contra Costa (the opposite coast, the shore opposite the bay of San Francisco), Del Norte (of the north), Plumas (feathers), Tulare (a place of tules), El Dorado (the golden land), Fresno (ash), Nevada (snowy), Sierra (mountain chain), Placer (gold diggings), Calaveras (skulls), Mariposa (butterfly), Alcatraz (pelican), Farallones (points of rock in the sea), Corte Madera (place where wood is cut), Monte (the mountain or forest), Loma Prieta (black hill), Monte Diablo (the devil's mountain), Montecito (little mountain or little forest), Alamo (elm or cottonwood tree), Alamo Mocho (the cropped cottonwood), Pájaro (bird), Coyote, and Tejon (a badger). Some of these names have been changed by the Americans. The Spaniards say, el Rio de las Mariposas (the river of the butterflies), el Rio de las Calaveras, el Rio de los Pajaros, la Isla de las Alcatraces, la Bahia de San Francisco (the bay of San Francisco), La Mision de San Gabriel (the Mission of San Gabriel), el Rio de las Salinas. The Americans drop the common Spanish nouns of *rio*, *bahia*, and *mision*, and say Calaveras River, Salinas

River, the Mission San Gabriel, etc. Though the plural form of Calaveras and Salinas has been preserved, the singular has been adopted for Pájaro River, Alcatraz Island, and Coyote Creek. Pájaro River was so named because of the great number of wild geese and ducks which were formerly seen in its valley. Bodega was named after a Spanish navigator on this Coast; Cape Mendocino after the noble patron of another. Amador County and Amador Valley were named after José M. Amador, who was manager of the property of the Mission of San José, about 1835. He lived in Amador Valley, and in 1848 he went with a number of Indians to mine in what is now Amador County. Vallejo, Pacheco, Martinez, and Alvarado, are the names of prominent men among the Spanish Californians. Some Spanish names have been changed into English. The American River was formerly called *el Rio de los Americanos*, because the Americans entering California usually came down the banks of that stream. The Feather River was called *el Rio de las Plumas*, the river of feathers. The "Plumas," after having been abandoned as a designation for the river, was given to the county in which it takes its rise. Angel Island was called *la Isla de los Angeles*, and Mare Island was called *la Isla de las Yeguas*. The town of Benicia was laid off in 1846, and was first called "Francesca," one of the Christian names of the wife of M. G. Vallejo, on whose land the town was to be built; but in January, 1847, the name of the town of Yerba Buena was changed to San Francisco, and the projector of Benicia, Mr. Charles D. Semple, thought it necessary, for the purpose of avoiding confusion, to change the name of his city on paper, so he adopted "Benicia," another name of Mrs. Vallejo. The town of Sonora was so named because the majority of the first miners there were from Sonora. The New Almaden quicksilver mine, for some months after the nature of the ore was discovered, was called *la Mina de Santa Clara*. Its present name was derived from the great quicksilver mine of Almaden, in old Spain.

§ 359. *Indian Names.*—The Indian names in California are numerous. Among them are Siskiyou, Klamath, Shasta, Tehama, Colusa, Yolo, Napa, Sonoma, Mokelumne, Tuolumne, Inyo, Mono, Chowchilla, Cahuilla, Tahoe, Saticoy, Hueneme (called also Wynema), Suscol, Suisun, Cosumnes, Temécula, Temascal, Jurupa, Petaluma, Tomales, Yreka, Ukiah, Cuyama, Cocomonga, Mayacmas, Bolbones, Guilicos, Huichica, and Hoopah. Most of these are the names of tribes of Indians. The Mokelumne, Tuolumne, Chowchilla, and Cosumnes Rivers were called by the Spaniards el Rio de los Moquelumnes, el Rio de los Tuolumnes, etc. The second syllable of Moquelumne was changed by the Americans, to be spelled with a *k*, which has the same sound as *qu* before *e* in Spanish. Cahuilla is sometimes vulgarly spelled "Kaweah" by Americans, who thus represent the Spanish pronunciation as nearly as possible. Klamath and Shasta were formerly written "Tlamath" and "Tshastl." Sonoma, by some persons written "Zonoma" in early times, is an Indian word meaning "valley of the moon." Temascal means an Indian sweat-house. Solano is a Spanish word meaning the south wind, but Solano County was so called after the chief of the Suisun tribe of Indians. I have not been able to learn whether his name was given to him by the Spaniards, or was of Indian origin. Marin County was also named after an Indian chief. Yreka is a corruption of Wi-é-kah, which means white, and is the Indian name of Mount Shasta, at the foot of which the town is situated.

§ 360. *American Names.*—Now we come to the American names. Towns are named after Jackson, Washington, Lafayette, and Stockton (the last was in command of the American navy on this Coast during the Mexican war). The patronymics of Alexander Humboldt, J. A. Sutter, Kern, and Peter Lassen, are affixed to counties. Trinity River was so named because the white man who discovered it in the mountains supposed it emptied into the bay of Trinidad, which had been discovered by the Spaniards several centuries ago. Marysville was first called Yubaville, and then named after Mrs. Mary Covillaud, one of the founders of the place. Among the pioneer miners of Calaveras County were Murphy, Angel, and Carson, and they became the eponyms of the places where they stopped, first called Murphy's Camp, Angel's Camp, and Carson's Camp, now become permanent towns, which have discarded the "camp," and assumed the titles, "Murphy's," "Angel's," etc. It is better to drop the *s* and the apostrophe, as is sometimes done. "Yankee Jim's Camp"—the surname of "Jim" was never known to the general public—is now simply Yankee Jim. Messrs. Downie, Weaver, and Heald were the respective eponyms of Downieville, Weaverville, and Healdsburg; and Folsom, Gilroy, and Hollister were named after the owners of the respective ranchos on which they were laid out. The knowledge or supposition of rich diggings is indicated by some of the names of towns, as Ophir, Gold Hill, Quartzburg, Placerville, Oroville, Rich Bar, and Tin Cup. Placerville was, in 1849, called Hangtown, because it was the first place where any person was hanged by Lynch law. Oroville is a compound of *oro*, the Spanish word for gold, and *ville*, the French word for city. Tin Cup was so named because the first miners there found the placers so rich that they measured their gold in pint tin cups. Many of the bars and camps in the mining districts are named after the discoverers or first settlers. There are Scott's Bar, Long's Bar, Kelly's Bar, Kanaka Bar, Negro Bar, Chinese Camp, etc. Other places are named from the native places of the first settlers, as Mississippi Bar, Ohio Bar, Iowa Hill, Michigan Bluffs, Illinoistown, Alleghanytown, etc. Pine Log is so named because there was, in early times, at that place a pine log across the South Fork of the Stanislaus River, in such a position as to offer a very convenient crossing to miners. Some of the mining camps are named from the tragic events which occurred there: thus, there is a Murderer's Bar, a Dead Man's Bar, and a Dead Shot

Flat. The following is a list of some curious names of mining localities:

Jim Crow Cañon,
Red Dog,
Jackass Gulch,
Ladies' Cañon,
Miller's Defeat,
Loafer Hill,
Rattlesnake Bar,
Whisky Bar,
Poverty Hill,
Greasers' Camp,
Christian Flat,
Rough and Ready,
Ragtown,
Sugar-Loaf Hill,
Poker Flat,
Wild-Cat Bar,
Dead Mule Cañon,
Wild Goose Flat,
Brandy Flat,
Gridiron Bar,
Hen-roost Camp,
Lousy Ravine,
Lazy Man's Cañon,
Logtown,
Git-up-and-git,
Gopher Flat,
Bob Ridley Flat,
One Eye,
Push-coach Hill,
Puppytown,
Mad Cañon,
Happy Valley,
Hell's Delight,
Devil's Basin,
Dead Wood,
Gouge Eye,
Puke Ravine,
Slap-Jack Bar,
Quack Hill,
Pepperbox Flat,
Nigger Hill,
Seventy-six,
Piety Hill,
Hog's Diggings,
Brandy Gulch,
Liberty Hill,
Love-Letter Camp,
Paradise,
Blue Belly Ravine,
Sluice Fork,
Shinbone Peak,
Seven-up Ravine,
Loafer's Retreat,
Humpback Slide,
Swellhead Diggings,
Coyote Hill,
Poodletown,
Yankee Doodle,
Horsetown,
Petticoat Slide,
Chucklehead Diggings,
Mount Zion,
Barefoot Diggings,
Plug-head Gulch,
Ground Hogs' Glory,
Bogus Thunder,
Last Chance,
Greenhorn Cañon,
Shanghai Hill,
Shirt-tail Cañon,
Skunk Gulch,
Coon Hollow,
Poor Man's Creek,
Humbug Cañon,
Bloomer Hill,
Grizzly Flat,
Rat-trap Slide,
Pike Hill,
Port Wine,
Snow Point,
Nary Red,
Gas Hill,
Ladies' Valley,
Graveyard Cañon,
Gospel Gulch,
Chicken-Thief Flat,
Hungry Camp,
Mud Springs,
Skinflint,
American Hollow,
Gold Hill,
Pancake Ravine,
Centipede Hollow,
Nutcake Camp,
Seven-by-nine Valley,
Paint-Pot Hill,
Gospel Swamp.

The Legislature in 1864 granted a franchise for the construction of a toll-road from Pokerville to Fiddletown in Amador County.

Butte County was named from the *buttes* or high hills on its border. Cache Creek was so called because some trappers buried or *cached* something on its banks many years ago. *Butte* and *cache* are words of French origin, introduced into the English language by trappers.

Anaheim is derived from Ana the Spanish for Ann, and the German word *heim*, meaning home—and the compound means Anna's home. The Ana was suggested by the Santa Ana Valley, in which Anaheim is built.

§ 361. *Etymology of California.*—The name "California," first used in an obscure Spanish novel, *Las Sergas de Esplandian*, published in 1510, was there applied to an island "on the right hand of the Indies near the Terrestrial Paradise." Twenty-five years later Cortez discovered the peninsula, and gave it the name of California. After 1769, the Spanish Government recognized two Californias, *Vieja* or *Baja*, (old or low) California, and *Nueva* or *Alta*, (new or high) California. The latter was conquered by the Americans in 1846, and was called "Alta California," until after the gold discovery, and then simply "California," when the peninsula fell into relative insignificance. The State Constitution, framed in 1849, commences, "We, the people of California," etc. This, therefore, is *the* California, and the peninsula south of us is not meant or thought of, unless we use the adjective prefix, and say "Lower California." "Southern California" usually means that part of American California south of latitude 34° 30′.

§ 362. *Pronunciation of Names.*—In the pronunciation of the names of Spanish and Indian origin, the letters have usually the Spanish sounds. *A* is like "a" in far; *e* like "a" in fare; *i* like "ee" in meet; *o* like "o" in go; *u* like "oo" in fool. *H* is silent; *j* and *g*, before *e* and *i*, have a sound similar to that of the English "h"; *s* never has the sound of z, but is always like "ss" in hiss. *Qu*, before *e* and *i*, is like "k." *Ll*, is like "lli" in William; ñ is like "ni" in union. There are no diphthongs in Spanish. Every vowel is sounded separately. Words ending in a vowel in the singular have the accent on the syllable next the last; those ending in a consonant, on the last. In case any vowel has an accent marked over it, then that vowel has the accent. The Spaniards of old Spain pronounce the *z* before all vowels, and the *c* before *e* and *i*, like "th" in thick; but the Mexicans give them the sound of *s*.

The errors which Americans most frequently commit in pronouncing Spanish words are, in giving to *a* the English sounds of "a" in fat and fate; giving to *s* the sound of "z"; to *j* and *g*, before *e* and *i*, the same sounds as in English; to *gu* the sound of the English "w"; and in putting the accent on the first syllable—English fashion. The following may serve as a further guide to the proper pronunciation of some of the names:

SPANISH NAMES AND PRONUNCIATIONS.

Diego—dee áy go.
Suisun—soo ee sóon.
Alameda—ah lah máy da.
Sierra—see ér ra.
Nevada—nay váh dah.
Mateo—mah táy o.
Monterey—mon ta ráy ee.
Luis Obispo—loo éss o bées po.
Los Angeles—lohs áhn hel es.
Vallejo—val yáy ho.
Vallecito—val yay thée to.
Joaquin—ho ah kéen.
Juan Bautista—hwahn bah oo tées-tah.
Tamalpais—tah mal pice.
Nietos—nee áy tos.

Napa—náh pah.
José—ho sáy.
Jesus Maria—hay sóos mah reé ah.
Puta—póo tah.
Tejon—tay hóne.
Farallones—fah rahl yó nes.
Gabriel—gah bree ále.
Rafael—rah fah ále.
Miguel—mee gále.
Pájaro—páh hah ro.
Coyote—co yó tay.
Pacheco—pah cháy co.
Cahuilla—cah oo eél ya.
Hueneme—way náy may.
Dos Pueblos—dohs pwáy blos.

This table is not a perfect guide to pronunciation, but only an approximation.

Placer has been anglicized so much that it is commonly spoken with the accent on the first syllable. Mokelumme and Tuolumne have the accent on the antepenultimate, and the vowel short. Siskiyou has the accent on the first syllable.

Sutter is pronounced with the *u* like "oo" in foot. Mokelumne is often mispronounced "Mac ál a my," and the Cosumnes River is not unfrequently called the Macosme. Folsom is pronounced like the adjective fulsome. Yosemite has four syllables with the accent on the antepenultimate (Yo sém i te). San Rafael is usually called "San Rah féll," Tehama "Te-háy ma."

§ 363. *Erroneous Spelling.*—The maps issued by the Federal Surveyor General's office have abounded with errors of spelling, chargeable to gross ignorance and carelessness. The publications of the State Geological Survey have a few. Whitney writes "Tamal Pais" instead of Tamalpais, and "Hetch-hetchy" instead of Hetchhetchy. The hyphen in Indian names is an absurdity, and has been abandoned in Tecumseh and Yosemite, and other words in common use. "*Pais*" in Spanish means county, and Marin County was formerly occupied by the Tamal tribe of Indians, and therefore it is supposed that the mountain should, out of respect for the Spanish language, be called "Tamal Pais." But the Spaniards united the two words, and instead of using *pais* separately, they would say "*el pais de los Tamales.*" A common error of writers ignorant of Spanish is to say "the sierras." This, as applied to the Sierra Nevada, is equivalent to speaking of the Rocky Mountain Chains. There is only one sierra in California.

CHAPTER XV.

CONCLUSION.

§ 364. *General Summary.*—Twelve chapters of this book have been filled with a detailed statement of the nature and characteristics of the resources, industry, trade, and society of CALIFORNIA. In this chapter, I shall present a summary of their main features.

We have, then, before us a State lying in the midst of the temperate zone, on the western coast of North America; bounded on one side by the Pacific Ocean, and on the other by a high range of mountains; reaching through nine degrees of longitude and ten of latitude; with a coast-line 1,097 miles long, and a total area of about one hundred and sixty thousand square miles. The heart of the State is drained by two large rivers, which run from north and south, unite midway, and in their course to the sea form three large and deep bays, with secure and spacious harbors. On these bays and their tributaries, there are nearly one thousand miles of navigable streams now used by steamboats and sailing-vessels.

The climate near the ocean is the most equable in the world. At San Francisco, there is a difference of only seven degrees between the mean temperatures of summer and winter—the average of the latter season being 50° and of the former 57° Fahrenheit. Ice and snow are never seen in winter; and in summer the weather is so cool, that heavy woolen clothing is worn every day. There are not more than a dozen days in the year too warm for comfort at mid-day, and the oldest inhabitant cannot remember a night when blankets were not necessary for a comfortable sleep. The climate is just of that character most favorable to the constant mental and physical activity of men, and to the unvarying health and continuous growth of animals and plants. In the interior, the summers are much warmer than near the ocean; while in the mountains the winters are much colder. By traveling a few hundred miles, the Californian can find almost any temperature that he may desire—great warmth in winter, and icy coldness in summer.

The rocks of this State are chiefly granite and slate in the Sierra Nevada, and cretaceous and tertiary sandstone in the Coast Range and valleys. Veins of auriferous quartz are numerous in the State near the granite, and they have supplied by erosion the gold now found in the placers or alluvial workings. Gold has been found in nearly every county; but the districts which are or have been rich in auriferous deposits, cover an area of 10,000 square miles. The annual gold yield of California is about $20,000,000.

The gold-mining of California is conducted in the most thorough and enterprising manner. Although the main principles of the sluice and the hydraulic washing were known and used, on a small scale, long before the discovery of gold in California, it was here that those modes of working were first perfected, applied on an extensive scale, and brought into universal use. Large rivers are turned out of their beds; mountains are pierced by tunnels; hills are washed away; and the rivers roll thick with mud to the sea through summer and winter.

The State has rich and productive mines of silver and quicksilver; valuable beds of borax, sulphur, asphaltum, and fire clay; and numerous mineral springs of powerful medicinal qualities.

The natural scenery of California is varied and grand. The Yosemite Valley is a chasm ten miles long, a mile wide, and three thousand feet deep, in the heart of the Sierra Nevada, without its equal in the world for sublime and picturesque scenery. It has a dozen great cascades, the highest of which has a fall of thirteen hundred feet. The Mammoth Trees are the largest growths of the vegetable kingdom. There are likewise in the State mud-volcanoes, natural bridges, many caves, and numerous hot and mineral springs, some of which throw out great columns of steam. The Californian Alps have a hundred peaks that rise to an elevation of more than 10,000 feet, and contain much scenery equaling, if not surpassing, any in Switzerland. Mt. Shasta is grandest of all the high, snow-covered volcanic peaks conveniently accessible to travel; and it has a great glacier. The view from Mt. Diablo is unparalleled for the richness and beauty of the country distinctly visible.

The animals and plants of California are peculiar to our coast. The finest group of coniferous trees in the world is that of this State. The mammoth tree, the redwood, the sugar-pine, the red fir, the yellow fir, and the *arbor vitæ*, all reach the wonderful height of three hundred feet; the mammoth tree grows to be thirty feet in diameter, the redwood twenty, and the others from eight to twelve.

The grizzly bear is the largest and strongest indigenous animal of the continent; and the Californian vulture is, next to the condor, the largest bird that flies. The sea near our coast teems with halibut, turbot, mackerel, herring, sardines, anchovies, and smelts; while sturgeon and salmon are abundant in our rivers.

Farmers in California have many advantages over men of the same occupation in other parts of the United States. The winter is never so cold as to interrupt their work, and there are no storms of rain and hail to destroy their grain and ruin their hay. They need no barns. Barley thrives better than in any other part of the world. The soil and climate are also particularly favorable to the growth of wheat, which unites the valuable qualities of whiteness, dryness, and glutinousness, to a greater degree than any other wheat in the world. Our average crops are larger than in any other place where manure is not used extensively. The yield of hops is large, and the facilities for drying them, so as to preserve their strength, are better than in any other land where they are cultivated. Our kitchen vegetables grow to an unparalleled size. Nowhere else have pumpkins been seen to reach two hundred and fifty pounds in weight each, beets one hundred and twenty pounds, white turnips twenty-six pounds, solid-headed cabbages seventy-five pounds, carrots ten pounds, water-melons sixty-five pounds, onions forty-seven ounces, Irish potatoes seven pounds, sweet potatoes fifteen pounds, and so forth. Some cabbages and beets have spontaneously become perennials here, continuing to grow from year to year, and remaining green throughout winter and summer; and many of our kitchen vegetables might be converted into perennials by preventing them from going to seed.

The abundance, excellence, and variety of our fruit astonish the stranger, though he may have come from the markets of London or New York, which draw tribute from whole hemispheres. No market on the globe surpasses ours in variety, yet only twenty years since we began to import fruit trees direct from the Eastern States and Europe. Our mild winters permit the trees to grow during nine or ten months in the year, and they grow more rapidly, and reach maturity more speedily, than in any other country where they are so healthy, and bear so abundantly. The pear and apple trees which were planted by the missionaries thirty or forty years ago, are still in perfect health, and some of them produce as much as a ton of fruit to the tree every year. The apple and pear seem to have found here their most congenial clime. There are no worms in our apples; no curculios in our plums or cherries;

no Hessian fly or weevil in our wheat. The olive and the fig grow luxuriantly beside the apple and the pear. We can produce olives better than any of the olive-producing regions of the Mediterranean, because we have none of those storms of thunder and hail and rain, which frequently destroy the crops in southern Europe and Asia Minor. The vine produces more abundantly than in any part of Europe, and the crop has seldom failed or been destroyed here, as often happens there. A yield of one thousand gallons of wine to the acre is as frequent, proportionately, in California, as of four hundred in France or Germany. Our gardens are, in time, to be the most beautiful in the world, resplendent with conifers and deciduous trees, with the flowers of the temperate zone, and the luxurious plants of the tropics. The shrubs, which in New York remain small, and live only under shelter as delicate exotics, are naturalized in San Francisco, grow almost to tree-like size, remain green throughout the year, and bloom during most of the months. The rosebush is covered with flowers from January to December.

Domestic herbivorous animals live and increase without shelter, and without cultivated food. They reach their full growth a year earlier than in the Eastern States. The absence of extreme cold gives them a more rapid growth, and exemption from many diseases. Sheep produce more wool, are healthier, increase more rapidly, and are kept at far less cost in California than in any American State east of the Rocky Mountains. Bees increase more rapidly, and make more honey here than there is any record of their doing elsewhere. Thunder and rain storms kill a large proportion of the silkworms in Italy, France, Turkey, and China every year; in the valleys of California we never have any lightning, and no rain during the season when the silk-worms feed.

The wages of labor in California are higher than in any other part of the world. Mechanics' wages are generally from two dollars and fifty cents to four dollars per day; common laborers, from one dollar and seventy-five cents to two dollars and fifty cents per day; farm laborers, and men and maid servants, from twenty to thirty dollars per month. Our imports and exports of treasure are larger in proportion to our population than those of any other State. Our chief city has an extensive foreign trade and commerce, and it has an undoubted supremacy in the commerce of the eastern shore of the Pacific.

§ 365. *Slow Growth.*—With many drawbacks, which have been set forth clearly and unreservedly, California is one of the richest parts of the globe. It possesses most of the luxuries of Europe, and many of the advantages which the Valley of the Ohio had forty years ago. It offers an open career to talents. In a few years of its history it has astonished the world, and its chief glories are still to come. The arts, the sciences, the refinements of life, are to find a favored home in California.

Why is it then that the permanent population of the State has not increased more rapidly? Why did so many of the early immigrants leave her shores, never to return, by their departure depriving her of the greatest element of wealth? The great cause was the mismanagement of land-titles, in both the agricultural and mineral regions, by the Federal Government; and myriads of men, unable to secure homes, went to the Eastern States, where they could find permanent residences.

The unsettled condition of society here, resulting from the insecurity of land-titles, the great expense of bringing families from the Eastern States, the uncertainty of the crops in the drier valleys, the scarcity of irrigating canals and of reclamation dikes, all contributed to prevent such an increase of population as the natural resources of the State, if properly developed, would have demanded.

§ 366. *The Future.*—The growth of California must be constant, and her future great and glorious. If sky and earth and man remain the same, her attractions cannot be neglected. Her progress may be relatively slow, until some of her large, dry valleys shall be provided with irrigation, and until her tule lands shall have been securely reclaimed; but so soon as extensive areas, now unfit for secure tillage, on account of the lack or the excess of water, shall have been protected against flood and drouth, there will be a rapid increase in her population and wealth, and a decided improvement in the character of her industry. She can and she will sustain a population of twenty millions.

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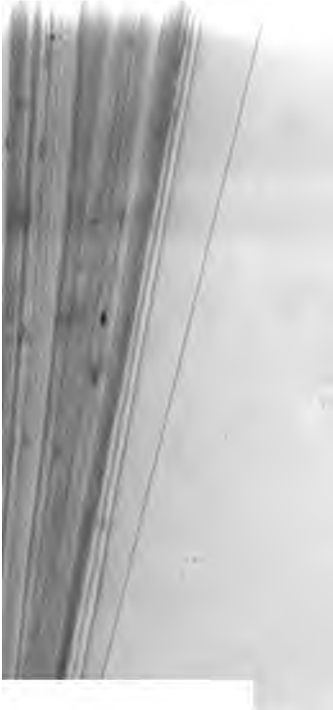

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